ROADS AND STREETS

HIGHWAYS BRIDGES
AIRFIELDS
HEAVY CONSTRUCTION

DECEMBER 1953

Gillette Publishing Co., 22 W. Maple St., Chicago, Ill.
Form 3547 Requested

Acceptance Authorized Under Sec. 34.64 P. L. & R.

UNIVERSITY MICROFILMS
EUGENE B. POWER R6
313 N. 1ST ST.
ANN ARBOR, MICH.
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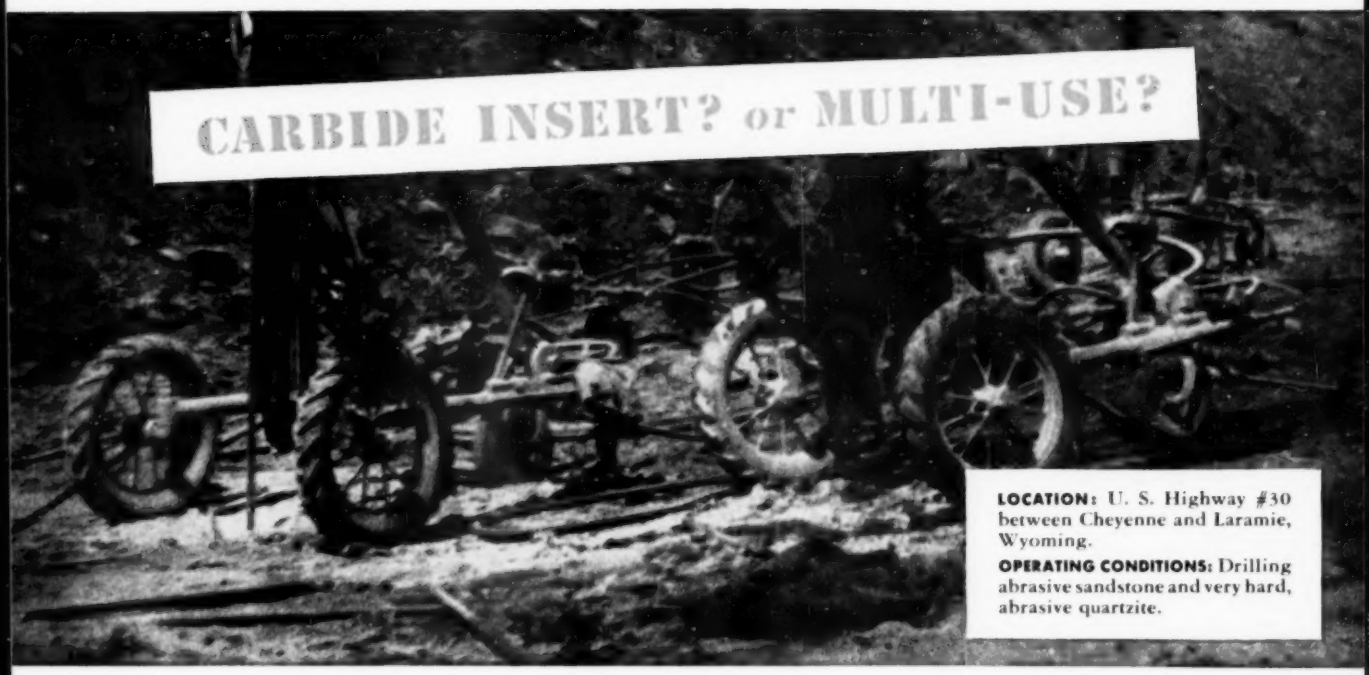

CARBIDE INSERT? or MULTI-USE?
LOCATION: U. S. Highway #30 between Cheyenne and Laramie, Wyoming.
OPERATING CONDITIONS: Drilling abrasive sandstone and very hard, abrasive quartzite.

Brown Construction Co. cuts costs on highway job by using TIMKEN® carbide insert bits to drill quartzite, multi-use to drill sandstone

BROWN Construction Company has found a way to cut drilling costs on its modernization job of U. S. Route #30 between Cheyenne and Laramie, Wyoming. How? By using Timken® multi-use rock bits to drill sandstone; and Timken carbide insert rock bits to drill quartzite.

Timken multi-use bits are most economical for ordinary ground like sandstone. With correct and controlled reconditioning, they give the lowest cost per foot of hole when full increments of steel can be drilled.

For hard and very abrasive ground, like quartzite, Timken carbide insert bits are the best answer for highest speed. They're also most economical for constant-gage holes, small diameter blast holes and very deep holes.

Best of all, both Timken carbide insert and multi-use bits are interchangeable in the same thread series. A wide range of different Timken bits fit the same drill steel. You can change bits quickly, easily as the ground changes—right on the job. Both Timken carbide insert and multi-use bits are made from electric furnace Timken fine alloy steel and have special shoulder unions which protect threads from drilling impact.

Make sure you use the best bit type for your particular drilling requirements. Call on the Timken Rock Bit Engineering Service. Twenty years of rock bit experience have made the Timken Company the leader in the field. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

Timken threaded multi-use rock bit

Timken threaded carbide insert rock bit

TIMKEN

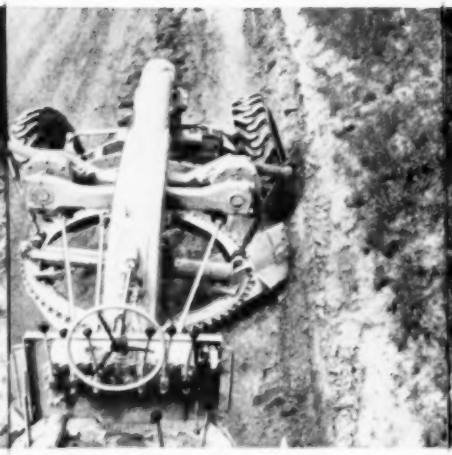
your best bet for the best bit . . . for every job

ALLIS-CHALMERS INVITES YOU TO . . .

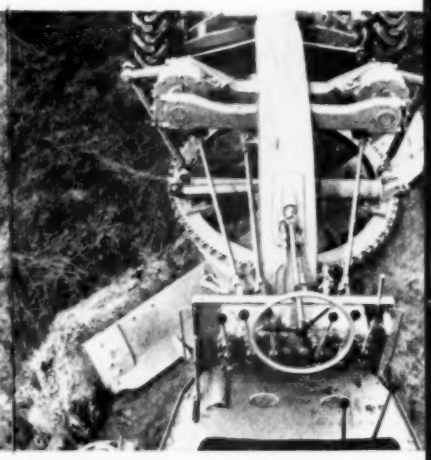
Look at Your Grader Jobs THROUGH THE EYES OF AN AD-40 OPERATOR . . .

GRADING — Look at that single member frame — it really lets you see what you're doing . . . means efficient grading on *any* job.

SLOPING — Look how much better you see . . . how much steadier your blade is with small control rods leading out to lift cases located directly over the circle.

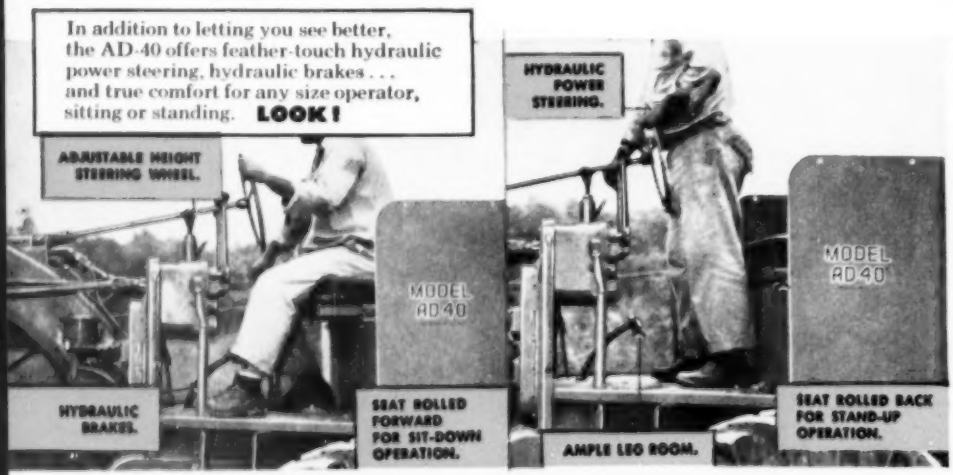


DITCHING — Look at the low control panel. It gives you a clear view of the blade . . . helps insure a clean, smooth ditch.



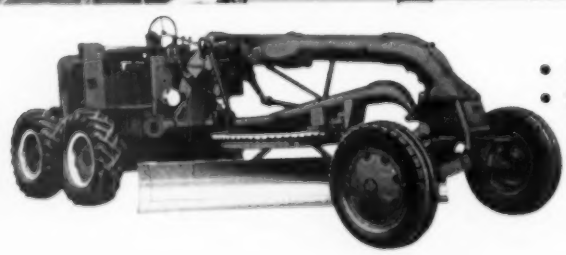
SOD STRIPPING — Look at the tapered corners on this clean, wide platform . . . how they give unequalled view of heel of ROLL-AWAY moldboard.

In addition to letting you see better, the AD-40 offers feather-touch hydraulic power steering, hydraulic brakes . . . and true comfort for any size operator, sitting or standing. **LOOK!**



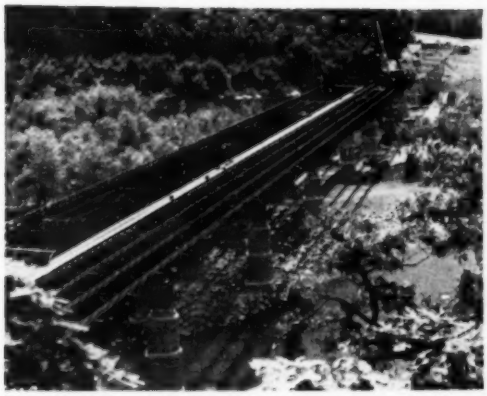
Yes the big, new AD-40 is designed for today's jobs and today's operators . . . brings new standards of performance to all users of motor graders . . . handles all grading jobs faster, better, easier. You owe it to your operators . . . and yourself to ask your nearby Allis-Chalmers dealer now for a demonstration and *see for yourself.*

ROLL-AWAY is an Allis-Chalmers trademark.



- 104 bhp. • Six speeds forward, three reverse
- 23,000 lb. (with optional calcium chloride solution in rear tires — 24,800 lb.).

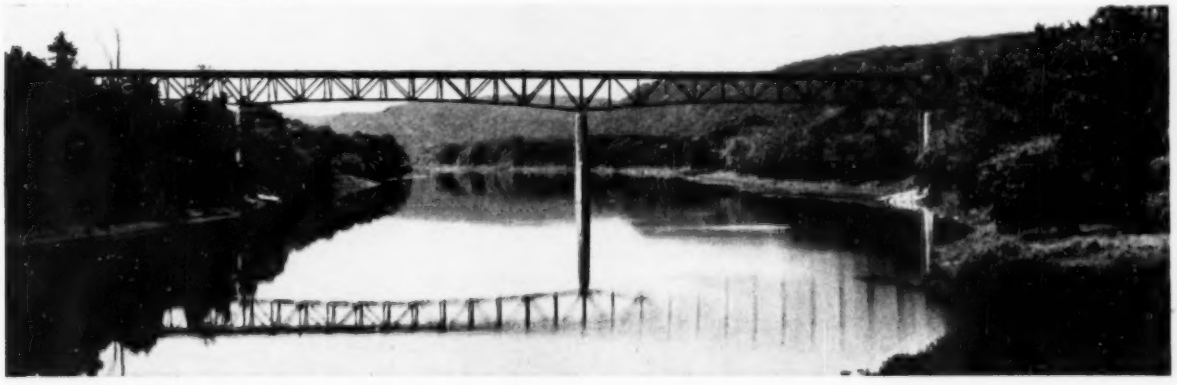
ALLIS-CHALMERS
TRACTOR DIVISION—MILWAUKEE 1, U. S. A.



Superstructure of bridge crossing the river at Delaware Water Gap. *Below:* Bridge across the Delaware between Milford, Pa., and Montague, N. J.

Three New Bridges Span the Delaware

To provide greatly increased facilities for crossing the upper Delaware River in the general area of the Delaware Water Gap, three new bridges together with elaborate approaches have been built for the Delaware River Joint Toll Bridge Commission. Steel for the bridges and the approaches, shown under construction, was supplied by Bethlehem, and included piling, fabricated steel, reinforcing bars, dowel units and bar mats.



Bethlehem Reinforcing Bars come to the job site at Portland Columbia bridge, ready for immediate placing.

Right: Paving one approach to bridge across Delaware river connecting Portland, Pa., and Columbia, N. J.

Below: Bethlehem Dowel Units being installed in the Pennsylvania approach to the Delaware Water Gap bridge. Contractor: George M. Brewster & Sons, Inc.

J. E. Greiner Co. were the engineers, and Johnson, Drake and Piper, Inc., the general contractors, for the substructure of the three bridges.

Paving contractors for the approaches were A. L. Rake and Son and G. H. Litts (for the Milford, Pa.-Montague, N. J. bridge), George M. Brewster & Sons, Inc. (for the Pennsylvania approach to the Delaware Water Gap bridge), and S. J. Groves and Sons Co. (for the Pennsylvania and New Jersey approaches to the Portland Columbia bridge, and the New Jersey approach to the Delaware Water Gap bridge).

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Bethlehem Products for Bridges and Highways include:
DOWEL UNITS • REINFORCING BARS • BAR MATS • GUARD RAIL • GUARD RAIL POSTS • WIRE ROPE AND STRAND PIPE • HOLLOW DRILL STEEL • SPIKES • BOLTS AND NUTS TIMBER BRIDGE HARDWARE • TIE RODS • SHEET- AND H-PILING • FABRICATED STRUCTURAL STEEL

BETHLEHEM STEEL

ROADS AND STREETS

DECEMBER, 1953 • VOL. 96 • No. 12

Roads and Streets represents 61 years of continuous publishing in the highway field; combined with Engineering & Contracting and Good Roads Magazines, established in 1892

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COL. V. J. BROWN, Vice Pres. and Coordinator
J. C. BLACK, Associate Editor

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A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations, and to the construction and maintenance of airports.

Coming Articles

Reviewing Roadbuilding's Biggest Year

. . . and an appraisal of broad construction trends and the outlook for 1954—a "different" kind of report, of interest to both contractors and engineers—see your January issue.

Design of a Small Prestressed Bridge

Example of a pre-tensioned bridge design, with complete calculations, by Col. Brown of the Gillette staff.

Paving Joints Sawed in Pour Sequence

Joint sawing experience, results and cost data, and other details of paving of large concrete apron.

Complete Reconstruction or "Fixing Up"?

An outstanding example of each design approach will be presented soon. One report will cover Oregon's relocation of U. S. 99 involving complete access control, as exemplifying a basic state policy. Another article will describe the widening, summit reductions, curve easement, and resurfacing of U. S. 20, New York.

A Veteran Contractor Talks About Equipment

What are the factors in estimating a job and determining what the equipment fleet shall be for a given project? Read the provocative article coming soon by a well known contractor.

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Publication and Editorial Offices: 22 West Maple Street, Chicago 10, Ill.

HALBERT P. GILLETTE, President and Publisher
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Chicago Office: 22 W. Maple St.
R. T. Wilson, Mid-West Manager
J. W. Gross, Western Manager
E. Bender, Clearing House Manager
J. L. Latta, Production Manager
L. R. Vickers, Circulation Manager

New York Office: 155 E. 44th St.
M. B. Nylund, Eastern Manager
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Lee P. McMahon, Vice President and Manager
W. P. Saunders, Representative
West Coast Office: 1126 Del Rey, Pasadena 8, Calif.
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for ROCK WORK

for FLOTATION

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SURE-GRIP
—top tire for drive-wheel traction on graders and pans

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HARD ROCK LUG
— super-tough champ for all kinds of rock work

—you can't beat the
ALL-WEATHER
— the earth mover that's finest for free-rolling wheels

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Sure Grip, All-Weather—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

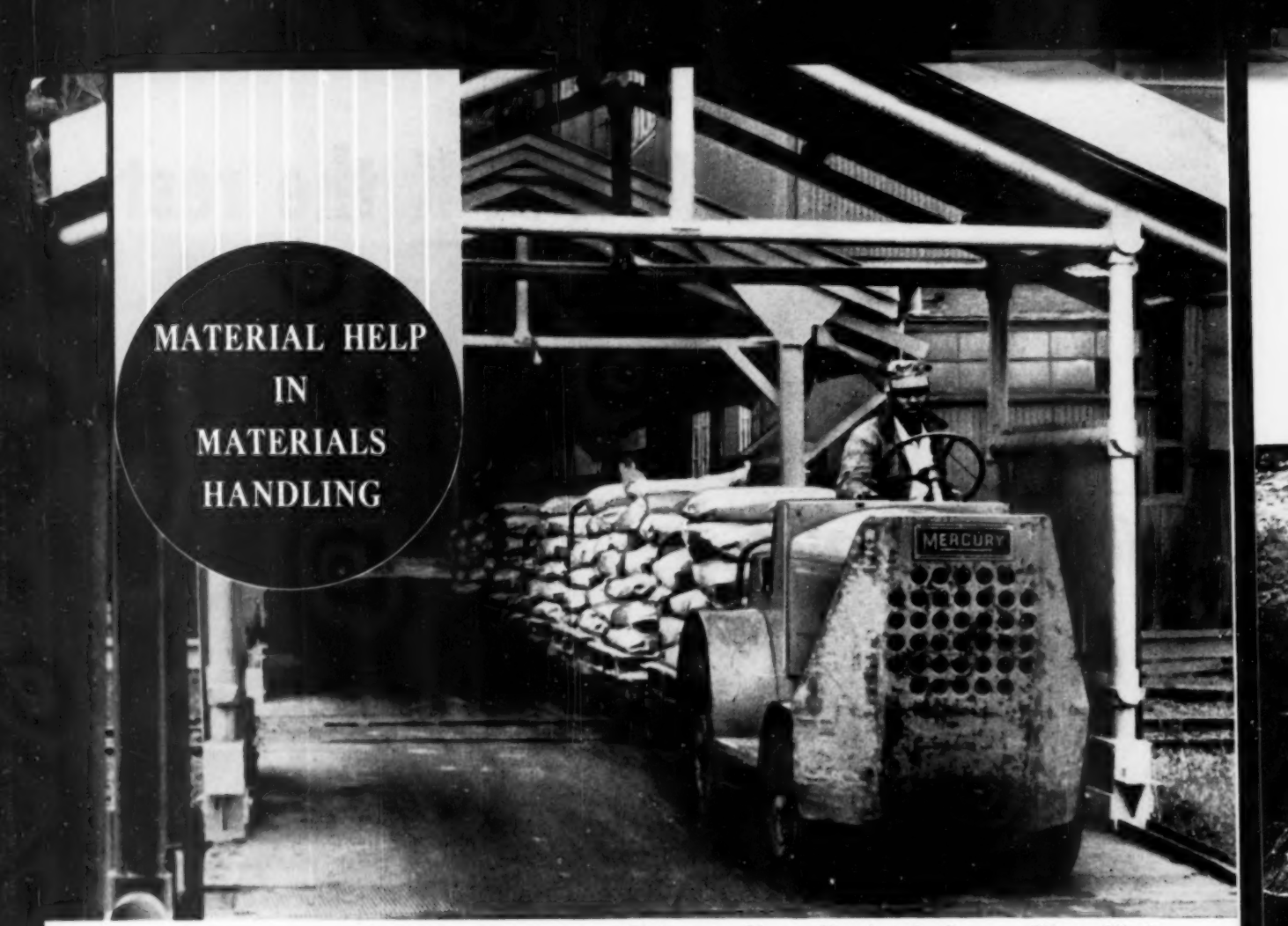
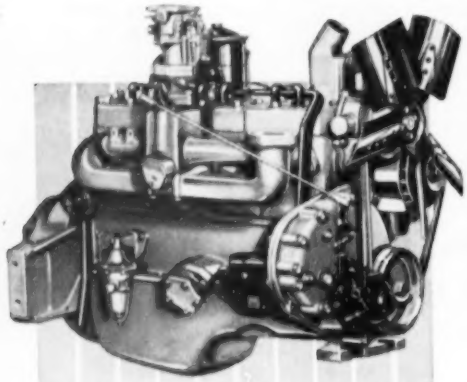


Photo courtesy Mercury Manufacturing Company, Chicago, Illinois

Pedigreed Power moves the products of industry . . . faster and at less cost



Every day is moving day in Industry. Raw materials, parts and finished products *must* move if supply is to meet demand. The system for moving materials in and around a modern industrial plant must be fast, economical and have the flexibility necessary to meet fast-changing requirements. Best solution is the modern towing tractor, small enough to scoot anywhere in the plant, powerful enough to pull loads heavier than itself.

Take the Mercury "Huskie" pictured here . . . it can pull a load of over 60 tons at a sustained speed of two and a quarter miles per hour. It can be equipped with snow plow, power-driven winch or sweeper-broom. Powering the "Huskie" is the six-cylinder, 251 cubic inch displacement Model 8 Chrysler Industrial Engine equipped with Chrysler four-speed transmission and velocity governor. Small, compact, with an amazing power-to-weight ratio, this engine is ideal for equipment requiring a light-weight, powerful engine.

Any Chrysler Industrial Engine, open or enclosed power unit, can be supplied with gasoline, natural or LP gas-burning carburetor, standard or gear-driven front ends (magneto or hydraulic pump drive), mechanical or velocity governor, standard, gyrol Fluid Coupling or torque converter transmission.

Remember, too, that Chrysler Power is not expensive. Production-line methods, adapted to specialized industrial engine building, provide a custom-built engine at mass-production prices. See a Chrysler Industrial Engine Dealer, or write: ***Dept: 1212, Industrial Engine Division, Chrysler Corp., Trenton, Mich.***

CHRYSLER
Industrial Engines

HORSEPOWER WITH A PEDIGREE

THIS SHOVEL KEEPS TRUCKS ON THE JUMP

The job shown here is an excavation for an addition to St. Benedict's Church, Irving Park and North Bell, Chicago, Ill. You'd call it a tough loading job anywhere you saw it. The material is concrete slab, brick, dirt and miscellaneous rubble from buildings that have been torn down. It's awkward stuff to handle. But Ray Trumbull, Chicago excavator, finds his Cat* No. 6 Shovel keeps five big trucks busy and loads out 800 cubic yards a day.

Mr. Trumbull also owns two Caterpillar HT4 Shovels. He reports: "Our Caterpillar machines stay on the job with low maintenance costs and make our operations very successful."

Watch a No. 6 Shovel at work. Watch it dig in and pick up a good two-yard bucket load. Then time its cycle as it swings to the truck, dumps and returns. You'll see why owners consistently get more production than with other makes of equipment. Every part is built with extra strength, for hard work and long life. Controls are simple to operate.

Ask your Caterpillar Dealer for an on-the-job demonstration. Make him *prove* how these shovels can deliver more yardage, with less down time, at lower cost. Call him today!

Caterpillar Tractor Co., Peoria, Ill.

CATERPILLAR*

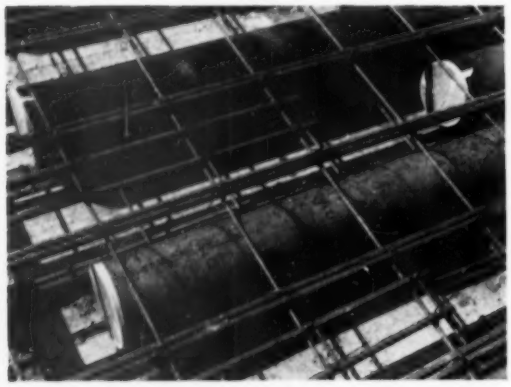
*Both Cat and Caterpillar are registered trademarks

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

REDUCE WEIGHT of CONCRETE SLABS

with

SONOVOID
LAMINATED FIBRE TUBES



ABOVE—Sonovoid tubes are shown as used in floor and roof construction. Note placement of reinforcing steel and simple tube caps.

ABOVE—For precast bridge members, the steel wire mesh and steel rods at the top of the members are shown above prior to pouring.

Voids formed with SONOVOID in reinforced concrete floor, roof, wall and bridge deck slabs eliminate the low-working concrete at the neutral axis WITHOUT impairing structural strength. These lighter weight slabs save concrete, reinforcing steel and aid in ease of handling. SONOVOID permits the prefabricating of prestressed and poststressed slabs which can be delivered in place by cranes. Widely used and approved by leading engineers and contractors.

***Save* CONCRETE!**

***Save* STEEL!**

***Save* MONEY!**

SONOVOID laminated fibre tubes are immediately available in sizes 2" to 36.9" O.D., up to 24' long, or longer on special order. Can be sawed to exact lengths on the job.

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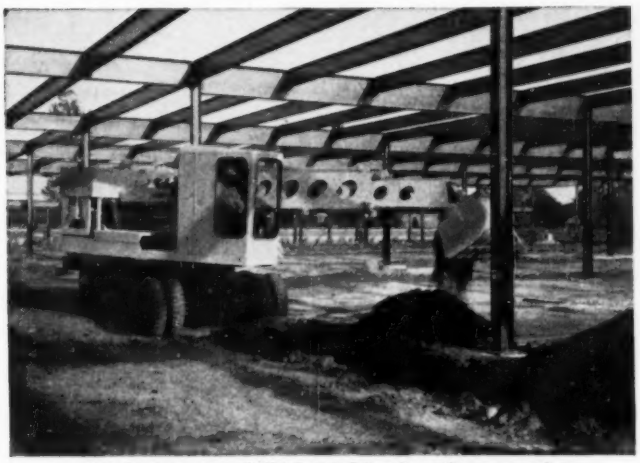
Construction Products Division
LOS ANGELES, CAL. — HARTSVILLE, S. C. — MAIN PLANT — MONTCLAIR, N. J.
GARWOOD, N. J. — BRANTFORD, ONT. — AKRON, IND.

Gradall—money-maker for contractors large and small!



A tight spot—a Gradall job! With its telescoping arm-action the Gradall works easily under the low roof of this building.

Gradall makes money for you on all these jobs and many more

- Trenching and back-filling
- Excavating
- Placing tanks, culverts, curbs, etc.
- Sloping and grading
- Ditch digging and cleaning
- Ripping and loading old pavement
- Hand finishing and clean-up

Large contracting firms, who can buy many different machines for big contracts, have proved the Gradall pays off on major projects. Gradalls do jobs no other machine can handle, and "hand-finish" work formerly confined to hand labor.

And they quickly find that a Gradall is no "specialist"! It invariably becomes a *permanent* part of their equipment, because it's *always busy.* It handles many "short run" jobs—eliminates the need for specialized (and often idle) machines—cuts the time and cost of cleaning up contracts with hand labor.

Smaller contractors, who must operate with one or two machines, go into business on a "bigger" scale with a Gradall With this multi-purpose machine they bid on *more* jobs—and more *complex* jobs—get jobs no other machine can touch. When work calls for accuracy it goes to the Gradall contractor because he doesn't have to depend on costly hand labor to get that accuracy. And Gradall works *fast,* so it's soon ready to speed to the *next* job. Gradall provides the very maximum of on-the-job time and profits!

Whether you're "big" or "small" in terms of the contracting business, it will pay you to arrange a field demonstration with your Gradall Distributor. He'll show you how a Gradall will *make money* for you!

Gradall
DIVISION OF WARNER & SWASEY Cleveland
PRECISION MACHINERY SINCE 1880

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YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

Move More with a MICHIGAN

"Ease of operation is outstanding . . . . . really a fine machine." — *E. E. Flomer, Supervisor,* NEZ PERCE COUNTY, IDAHO

HERE ARE THE JOB FACTS →

JOB	**Clean ditches, 8 miles of country road**
MATERIAL	**Gumbo clay and hard pan**
MACHINE	**MICHIGAN TMDT-16, shovel**
OWNER	**Nez Perce County, Lewiston, Idaho**
YARDS HANDLED	**200 per day**
FUEL	**About 2 gal. per hour**
COMMENT	**"Air operation is amazingly easy and smooth. With Remote Control and air power, the operator does the entire job himself—everything but drive the trucks. A fine piece of equipment." E. E. Flomer, Nez Perce County Supervisor.**

ONLY WITH MICHIGAN DO YOU GET ALL FIVE OF THESE COST-SAVING FEATURES— *convincing proof that you get More for Your Money in a MICHIGAN!*

MICHIGAN AIR CONTROL—operate a MICHIGAN yourself and you'll quickly see the difference. You can *feel* the smoothness of its fast swing. The MICHIGAN has *always* been air-powered, and therefore easier on the operator, faster to respond, without jerks and grabs.

CIRCLE GEAR and HOOK ROLLER PATHS CAST INTEGRAL—Look underneath a MICHIGAN in action and see this heavy alloy steel casting—impressive proof of rugged, long-lasting dependability.

TURNTABLE and SIDE FRAMES CAST INTEGRAL—Ordinarily you find this heavy-duty construction only in the largest shovels—MICHIGAN turntable deck, side frames and hook-roller mounting brackets are a single casting. There can't be misalignment, so a major cause of wear and replacement is eliminated.

CLUTCH REPLACEMENT IN MINUTES—Truly a triumph—this single-disc double-face clutch with six interchangeable segments on each face. Clutch relining, once a slow and costly business, is now a matter of minutes.

FAR FEWER PARTS TO SERVICE—Compare MICHIGAN air control simplicity with a mechanical system's complicated linkage—toggles, rods, joints, bushings, all requiring daily greasing. Hours of "dead" time transformed to working time.

It's good buying to make your own point-by-point comparison of a MICHIGAN against other machines of equal capacity. Then you'll see why more than 60% of MICHIGANS sold are "repeat sales"—to satisfied owners who know they get More for Their Money in a MICHIGAN.

Talk to your MICHIGAN dealer—
and write for literature.

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Construction Machinery Division
CLARK EQUIPMENT COMPANY
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With no obligation, please send me engineering data for laying a test strip of natural rubber-asphalt pavement as follows:

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2. New Construction ☐ Resurfacing ☐

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Type: Hot ☐ Cold ☐	Grade of Bitumen .....
Grade of Asphalt	Application Rate ....gals. per sq. yd.
Penetration	
Depth of Top Course ..... inches	COVER MATERIAL
Aggregate Content .....%	Type of Aggregate .....
Aggregate Top Size .....%	Size of Aggregate .....
Bitumen Content .....%	Lbs. per sq. yd. .....

Name .....
Title .....
Dept. .....
Address .....
City ..... State .....

☐ Please send booklet "STRETCHING HIGHWAY DOLLARS WITH RUBBER ROADS"

☐ Please send information about new 30-minute motion picture on rubber roads

Natural Rubber Bureau

1631 K STREET, N. W. WASHINGTON 6, D. C.

Natural Rubber Bureau Research Laboratory
Rosslyn, Virginia

NEW INTERNATIONAL MEDIUM-DUTY FOUR-WHEEL DRIVE TRUCKS

For Off-Highway or Highway Operation

Now, INTERNATIONAL Truck advanced engineering makes possible another development in transportation efficiency—*two new medium-duty four-wheel drive models* that open new possibilities for truck operators in scores of fields.

You can haul men, tools, equipment to any job—through mud, sand, and snow—over terrain where conventional trucks can't go. With front axle disengaged, you can operate normally on the highway.

Tough-job engineered. These new models are built for the toughest kind of work. Like every INTERNATIONAL, they give the low operating and maintenance cost and long life that have made INTERNATIONAL the heavy-duty sales leader for 21 straight years.

These new INTERNATIONAL 4x4 models have the stamina, ruggedness, and versatility for the toughest jobs. See one today. See how it fits your work. Time payments arranged. See your INTERNATIONAL Dealer or Branch for all the facts.

INTERNATIONAL HARVESTER COMPANY • CHICAGO

New INTERNATIONAL R-160 (4x4) with 2 yard dump body and reversible trip blade 8½-foot snow plow. GVW rating, 11,000 lbs. Famous Comfo-Vision cab.

Brief Specifications of these new INTERNATIONAL medium-duty 4x4 models

Two chassis models. Model R 140 (4x4)—130 inch wheelbase, 60 inch CA; 142 inch wheelbase, 72 inch CA, GVW rating 11,000 lbs. Model R 160 (4x4)—154 inch wheelbase, 84 inch CA; 172 inch wheelbase, 102 inch CA, GVW rating 15,000 lbs.

All-truck power. Model R 140 (4x4), 100 hp. Silver Diamond 220 valve in head engine. Model R 160 (4x4), 108-hp. Silver Diamond 240 valve in head engine.

Eight forward speeds, two reverse. Transmission has four forward speeds, one reverse, with 2 speed transfer case.

Easily converted for highway use. Special transfer case permits disengaging front axle for normal 2 wheel drive operation.

Transmission power take-off openings on right and left side to handle front mounted winch.

International Harvester Builds **McCORMICK**® Farm Equipment and **FARMALL**® Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

Better roads mean a better America

INTERNATIONAL® TRUCKS

"Standard of the Highway"

CRAWLING is often necessary but for SPEED

there's nothing like rolling on WHEELS!

Under many conditions crawlers are the most practical type of mounting. BUT, very often traction is not much of a problem for shovels, cranes and draglines and you can make terrific savings by using a high speed LIMA PAYMASTER on wheels.

The picture at the right shows a LIMA Type 34-M PAYMASTER crane, equipped with a 35-ft. boom, unloading coal from a barge at an eastern Pennsylvania power plant. Note that it is mounted on an undercarriage with 12 rubber tired wheels.

This LIMA 34-M is a natural for industrial plants . . . it offers fast mobility between widely separated jobs, traveling up to 8.24 MPH on a 2.75% grade and 0.94 MPH on a 22.5% grade with four-speed transmission. Just one man is needed to operate it and a single engine powers the crane motions and propels the carrier. It can lift up to 20 tons and is readily convertible to a dragline.

If you would like to know more about how the LIMA Type 34-M PAYMASTER will pay off with speed and efficiency for your operations, drop a note to—

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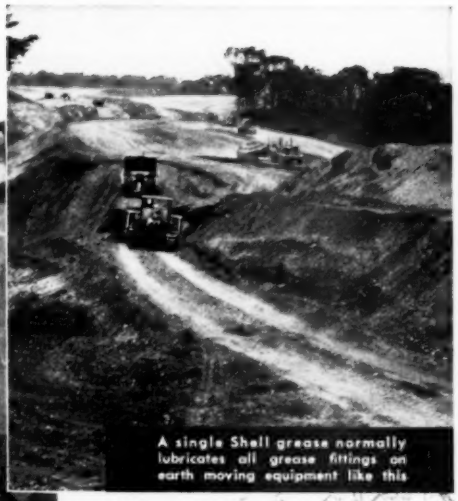
On the New York State Thruway

Shell crankcase lubricants keep heavy duty tractors on the job for S. J. Groves & Sons: 5,000,000 cu. yd. grading and paving contracts



A single Shell grease normally lubricates all grease fittings on earth moving equipment like this

Severe operation causes no motor problem with Shell Heavy Duty oil in the crankcase

Shell E. P. Gear Lubricant takes the punishment during rough going on steep grades

Arute Bros., Inc. depend upon the "stay-put" qualities of Shell's Multi-Purpose Grease for continuous heavy duty work

... 1 out of every 3 construction miles uses SHELL PRODUCTS *exclusively*

That's just one way of saying that Shell has been awarded contracts by companies responsible for building sections of the New York State Thruway totaling over one third of the entire mileage. And the contracts are still coming in!

Trucks, shovels, dozers, graders . . . all equipment run by gasoline or diesel engines on those long stretches of highway construction . . . benefit from the outstanding performance of Shell heavy duty lubricants.

Products that can win the unqualified preference of such responsible and efficient operators must have what it takes . . . and Shell products *have* it . . . plenty!

Most popular on the Thruway, and equally popular wherever heavy duty engines operate, Shell lubricants keep on protecting, defying wear, and keeping maintenance costs at rock bottom. Why not specify Shell for your equipment?

Thruway Map © by General Drafting Co., Inc., Convent Station, N. J.

2½ cu. yd. Shovels thrive on Shell Heavy Duty Lubricants under extremes of load conditions

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However, there is a difference in the third requisite for safe highways—the pavement. Rigid concrete can be designed accurately for any present or anticipated axle load—and it will *keep* that load-carrying capacity throughout its life. For this and other reasons described at the right concrete is the safe pavement.

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BETTER NIGHTTIME VISIBILITY

Concrete's light color reflects up to four times more light than dark-colored pavements. That enables drivers to see curves, obstructions, pavement edges, animals or pedestrians sooner and more clearly and to slow down or stop safely.

EVEN SURFACE

Rigid concrete pavement retains its low crown and even surface throughout its long life. It stays free from such driving hazards as ruts and washboard wrinkles and it does not develop surface irregularities that require frequent patching.

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ONE REASON WHY BUCYRUS ERIE BLADES CUT ROADBUILDING COSTS

WHAT BALANCED DESIGN IS ... Bucyrus-Erie bulldozers and Bullgraders are mounted on International TD-14A and TD-18A tractors so that the vital balance point of the tractor remains virtually unchanged.

WHAT IT DOES . . . It means that the tractor retains all of its original tractive effort and maneuverability. It puts maximum driving force where it belongs — at the blade. Because there is always a full length of track on the ground, you take full advantage of tractor power and get fine, accurate control over the blade. Finally, there is less wear and tear on the tractor.

HOW IT CUTS ROADBUILDING COSTS . . . Better blade control and tractor maneuverability enables operator to produce accurate grading and fine finishing in a minimum of passes — *you save time.* Having the advantage of full tractor power lets you move more dirt on every pass and get the job done faster — *you save money.* Since there is no waste of tractor power, *you save fuel costs.* And lastly, because there's no upset of balance to strain the tractor there's less wear on tractor parts — *you save maintenance costs.*

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MOVE MORE YARDS PER DOLLAR

WITH THIS BIG-YARDAGE LOADER!

This Cat*-powered Sierra Loader with D8 Tractor and single operator is working in a borrow pit on the Madera Irrigation Canal project for H. Earl Parker, Marysville, Calif. The hardpan's like rock—you have to rip all except the very surface, but this rugged rig is taking the rough going in stride. It keeps 25 trucks busy on a 3½-mile haul. Average load per truck—8 yards. Production per 8-hour day—2000 yards. Superintendent George L. White makes this comment: "We like our loader fine. It's really a dirt-moving machine."

With this big-capacity, one-man rig, you have a setup that cuts hours and dollars off earthmoving costs. The Sierra's 42" disc plow has a "slicing" action that assures fast cutting in tough material. Its 27-foot conveyor raises and lowers quickly at a touch of the control lever. Visibility is excellent, enabling the operator to maintain the right height for high- or low-side haulers for fast loading. All controls are handy to the operator's seat. And the rig has high maneuverability—a short turning radius makes it ideal for use in short or circular pits. Like all Caterpillar-powered equipment, the Sierra Loader, with its Cat D318 Engine, is built to stay on the job day after day with a minimum of down time.

Your Caterpillar Dealer, a reliable source of service and information, will be glad to give you complete facts about this money-saving loader. Ask him to show you how it can help you move more earth for less. Call him today for a demonstration!

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**NAME THE DATE...
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Roads and Streets in the News

Voters OK $750 million public works bonds

By approving more than three-quarters of a billion dollars worth of state and local bond issues for a variety of public works projects, the public gave little indication at the November 3rd election that its distaste for tax burdens has yet reached the point where it is willing to accept the curtailment of governmental services which would have to precede any effective general tax reduction trend.

In contrast with the huge total of bond issues authorized in an off-year election, only about a half-million dollars of borrowing proposals were rejected by the voters.

In local elections in Ohio, approval of the voters was given to a $35,000,000 Cuyahoga County bond issue for a Cleveland area subway to tie in with a $29,500,000 rapid transit system already under construction; $7,000,000 of Cleveland urban redevelopment bonds; $14,000,000 of Columbus school district bonds; $10,000,000 Akron sewer bonds, and $5,150,000 Youngstown bonds for various purposes.

Philadelphia voters approved bond issues totaling $76,400,000, including $35,750,000 water and sewer and other revenue bonds; $19,000,000 for slum clearance, libraries, parks, recreation centers, health centers, airport and other improvements; and $21,650,000 of bonds already authorized by the City Council, thus permitting the council to issue an equivalent amount again without referendum approval.

Chicago Approves Big Issue

Chicago voters sanctioned bond issues totaling $36,000,000, including three issues of $10,000,000 each for bridge construction, refuse disposal and electric street light system; $2,000,000 for central municipal heating plant and system, and $4,000,000 for city buildings. A $400,000 bond issue for suburban voting machines was rejected by Chicago area voters.

A $6,000,000 city bond issue to cover half the cost of a projected $12,000,000 sewage treatment plant for the Louisville area was approved. Plans call for the Metropolitan Sewer District to finance the other half of the plant through revenue bonds amortized by increasing rates charged users.

Voters in seven Connecticut towns and cities comprising the Hartford Metropolitan District approved appropriations totaling $6,500,000 for improvement of water and sewer facilities. . . . Voters of a sanitary district in Virginia's Henrico County approved a $3,950,000 water and sewerage system bond issue.

Major instances of bond issue rejections included the defeat in San Francisco of six bond proposals totaling $16,684,000, including issues for the municipal railway, swimming pools and playgrounds, an exhibit hall, library, and a voting machine storage warehouse.

Theodore R. Dalton, the unsuccessful Republican gubernatorial candidate in Virginia, had advocated a $100,000,000 highway bond issue, while Thomas B. Stanley, the successful Democratic candidate, advocated continuance of the state's pay-as-you-go highway financing policies. While the extent to which this issue figured in the election outcome is conjectural, it appears certain no state road bonds will be approved under the Stanley administration.

Ohio Citizens approve $500 million road bonds

Top of the news in the November elections, with respect to highways, was the OK which the people of Ohio gave the $500 million road bond program up for referendum. The measure's passage is considered a mark of the growing public awareness of highway needs, having passed without conspicuous fanfare of promotional backing. Urban counties voted strongest for the bonds. Rural counties along with Governor Frank J. Lausche urged pay-as-you-go financing.

The Ohio legislature last spring put the road bond issue question up to voters for a choice between pay-as-you go and a speed-up designed to get new arterial roads in 10 years instead of 20 or more.

The proposal called for retirement of the bonds by proceeds from an additional cent-a-gallon gasoline tax and a ton-mile levy on trucks, both already in effect. It set forth several restrictions: an annual bond issue limit of $125 million, a deadline of March 31, 1962, on bond issues, complete retirement of all bonds by 1972, use of all bond proceeds on major thoroughfares, and all construction to be by the contract method.

Expenditure of the funds will be directed by the Ohio department of highways, under a priority program and within an arterial road classification to be worked out by a highway board established by the legislature.

THE VOTERS WERE IN BONDING MOOD

In the November election over the nation, notes U. S. News and World Report, voters said "Yes" to some of the many local bond proposals, "No" to others. No major road, street, or bridge proposal was voted down. Among the issues approved:

OHIO
$500 million for highways.

PHILADELPHIA
$54.7 million for sewers, water, other municipal improvements.

ST. PAUL, MINN.
$38.9 million for streets, bridges, schools, buildings.

CHICAGO
$36 million for lighting, bridges, buildings.

CUYAHOGA COUNTY (CLEVELAND)
$35 million for subway transit.

10% rise in roadbuilding predicted for 1954

A ten per cent rise in highway work, one of the highest percentage rises of any construction category, was predicted for 1954 by the U. S. Commerce and Labor departments in a recent report. Based on a number of assumptions as to the nation's economic health, this report estimated an overall construction level of $34 billion, only a slight dip from the estimated 1953 level of $34.7 billion.

The detailed estimate, in order of percentage comparison with 1953:

Warehouses, office and loft buildings—up 15 per cent.

Highways—$3,450 million (construction only)—up 10 per cent.

Sewers and water—up 8 per cent.

Stores, restaurants, garages—up 6 per cent.

Public utility—up 3 per cent. (All segments up except rail and local transit).

Government non-residential—(schools, hospitals, atomic, etc.), down 1 per cent.

Private housing—down 4 per cent.

Conservation, reclamation—down 10 per cent.

Military—down 12 per cent.

Farm construction—down 12 per cent.

Industrial building—down 14 per cent.

Ohio Turnpike awards nearing 100% mark

All of the 241 miles of Ohio Turnpike Project No. 1 are either under construction or have been advertised for letting with the exception of the 4-mile section which includes that portion of the Turnpike passing through the very northern edge of the city of Elyria.

Although it has been hoped to have all of the Turnpike under contract by the end of 1953 so that construction of the entire Project could proceed without delay, the Ohio Turnpike Commission has had to postpone advertising for bids for construction of "the Elyria Section" pending efforts to reach an agreement with the city of Elyria which would persuade the city to drop its opposition to location of the Turnpike.

Continuing Pressure Noted for More State Road Funds

Continuing pressure for heavier highway-user taxes and more borrowing to finance unsatisfied highway modernization needs is reported from many states, despite the widespread legislative enactments of this type in recent years.

Already scheduled for consideration by the 1954 Colorado legislature is a proposal for the imposition of $3,650,000 in additional annual taxes on the trucking industry. Other Colorado highway financing proposals may include a revival of Governor Thornton's unsuccessful 1953 recommendation for authorization of the issuance of anticipation warrants against future highway revenues.

Kentucky lawmakers next year are expected to consider a plan suggested by the Kentucky Good Roads Federation for revenue-bond financing of $162,000,000 worth of primary highway system improvements. Under the proposal, the legislature would create an authority with the power of eminent domain and the power to issue revenue bonds for road improvements. The legislation also would empower the State Highway Department to convey to the authority the roads selected for improvement.

The contemplated Kentucky authority would issue revenue bonds, improve the roads with the money, then lease them back to the State Highway Department for sufficient rentals to service the bonds. The highway department would pay the rentals from an earmarked portion of the state's present 7-cent gasoline tax. Intent of the plan is to circumvent Kentucky's state constitutional debt limit of $500,000.

Opposition to the revenue bond proposal or other means of raising additional highway funds in Kentucky may develop on the grounds that action should be deferred pending the outcome of a two-year survey of the state's road requirements being conducted by the Automotive Safety Foundation.

Michigan lawmakers will be asked to authorize another survey of state highway needs. Senator Haskell L. Nichols of Jackson, who heads a special State Senate highway study committee, indicated such a proposal will be submitted to the Michigan legislature in January, together with a declaration that present state gasoline and weight tax revenues are inadequate for highway modernization needs.

The Nichols committee recently heard representatives of a score or more motor transportation groups and others interested in highways express general agreement that a 1947-48 statewide study of Michigan highway needs already is outdated. Their proposal for another survey of present and future road needs carried with it a request for a separate fiscal study to recommend ways of financing the additional cost of broadening the state's highway construction program. Part of the study would cover the possibility of expanding the proposed Michigan toll road program and relying more heavily on bond financing to expedite urban expressway construction.

Enactment of 1951 legislation increasing the state gasoline tax by 1½ cents a gallon and boosting weight taxes paid by trucks and buses resulted from the earlier Michigan roads study.

Mississippi. An anticipated legislative proposal calls for a $30,000,000 bond issue for secondary roads. The bond issue, previously suggested by Governor White, would be amortized from the state's present 7-cent gasoline tax.

New York. Awaited is a report from the Temporary State Commission on Highway Financing which is expected to recommend a state gasoline tax increase and possibly other highway-user tax boosts, together with a bond issue, to finance a multimillion dollar highway construction program.

A report current since the last session of the New York legislature is that Governor Dewey plans to back a $2,800,000,000 highway program suggested by the State Public Works Department with a 2-cent gasoline tax increase.

Since the $50,000,000 in additional annual revenue which would result from boosting the New York gas tax from 4 to 6 cents a gallon would provide only a relatively small share of the annual total of $280,000,000 needed to finance the total program proposed by the State Public Works Department, it is expected that the balance may be sought by borrowing. A bond issue would require popular approval at a statewide referendum.

Virginia. A subcommittee of the Virginia Advisory Legislative Council has recommended that the state gasoline tax there be boosted from 6 to 7 cents a gallon, but the proposal is expected to run into strong opposition in the 1954 state legislative session. Such a tax increase would yield $8,000,000 to $10,000,000 in additional annual revenue for primary highway construction.

Ohio lawmakers will convene in special session Jan. 11 to implement the $500,000,000 highway bond issue measure approved by the voters at the November election. (See page 17.)

In addition some $43,000,000 in extra annual highway revenue will be available in Ohio from the 1953 legislative enactment of a 1-cent gasoline tax increase and a new axle-mile tax against trucks.

Louisiana. Up to a half-billion dollars in addition to regular expenditures may be required to finance an adequate Louisiana highway construction program, it has been estimated by State Senator James D. Sparks, chairman of the State Legislative Council's highway committee.

A survey of Louisiana's road requirements now being conducted by the committee will not be completed until next September and thus will not be ready for consideration by the regular 1954 state legislative session. Sparks has said he would ask Governor Kennon to call a special legislative session to act on the survey findings, when completed, and to seek means of financing the program.

North Dakota. An initiated proposal to raise additional highway construction revenue is expected to be placed on the primary election ballot in North Dakota next June. It will call for: A 1-cent non-refundable gasoline tax, to yield an estimated $2,750,000; earmarking of about $3,000,000 annually of sales tax receipts from automobiles, parts and services for highway purposes; and a 5-mill general tax levy for highway construction.

Interim Studies

A special legislative interim committee is studying ways and means of financing an expanded long-range highway construction program in Arizona, but it has not yet been indicated what, if any, proposals will be submitted to the 1954 legislative session. Similar interim studies are under way in a number of other states, including Florida, Minnesota, New Jersey, Oklahoma, Tennessee, West Virginia and Wyoming.

Minnesota. Proposals for an increase of 1 or 2 cents in Minnesota's 5-cent gasoline tax rate and issuance of highway bonds, as means of providing additional funds for road modernization, have been heard by the Minnesota Highway Study Commission. The Minnesota legislature, which doesn't meet again in regular session until 1955, has the power to authorize $10,000,000 a year of bonding for improvement of trunk highways, to a maximum of $75,000,000. Anything greater would require a referendum.

Oklahoma. Governor Murray has expressed agreement with the Oklahoma State Legislative Council's executive committee that an adequate road building program will be a major issue for the 1955 state legislative session. Speaking favorably of the Council's plans to study a road program for submission to the next legislature, Murray expressed hope the study will include highway-user taxes. "The

money to build roads will have to come from those who use the roads, either by tolls or other taxes," he observed.

Montana. Increased highway user levies enacted by the 1953 Montana legislature already are reported as inadequate to solve the state's road financing needs, indicating that new revenue proposals are certain to be an issue at the next session in 1955. The Montana lawmakers in 1953 increased gross vehicle weight taxes on trucks traveling more than 12,000 miles a year; raised minimums on logging and farm trucks which enjoy a discount from the regular trucking fee; and provided for tighter enforcement of both the gross vehicle tax and the gasoline tax refund laws.

North Carolina. Probability of a future highway bond issue to finance construction needs has been suggested by State Highway Chairman A. H. Graham, who said, however, that he didn't think "now is the time to advocate it." He did not mention the size of the bond issue he had in mind.

Pennsylvania. Secretary of Highways Edward L. Schmidt recently reported that a public opinion survey conducted by his department's planning and traffic division indicated that a majority of Pennsylvanians believe more money should be spent on highways even if it means higher taxes.

Wisconsin. An increase in the Wisconsin gasoline tax rate to provide the state with "adequate funds to build and maintain safe highways" has been advocated by the Wisconsin Automotive Trades Association. Several gasoline tax boost bills failed of enactment during the 1953 Wisconsin legislative session, but are virtually certain to be brought up again in 1955.

Texas is another of the many states facing future proposals for highway-user tax increases. State Highway Commission Chairman E. H. Thornton, Jr. has warned that the only alternative to providing more money for streets and highways would be to limit the number of cars and trucks.

Chicago's Lake Shore Drive extended north

The problem of linking urban expressways with the surrounding street grid-iron was underscored recently by the completion of an extension to Chicago's famous Lake Shore Drive.

This 8-lane drive funnels commuters into and out of Chicago's downtown "Loop," using a 6-and-2-lane pattern for peak hours. Heretofore every evening this peak traffic has sped north at 45 mph, only to see vehicles trapped by long tie-up at Foster Avenue, where the drive terminated. An average of 66,000 vehicles has used this junction.

The new extension to Bryn Mawr Ave. is part of a scheme to take traffic on northward along the lake, so that it can spill off at three points—Bryn Mawr and Hollywood avenues as well as Foster—thus affording some dispersion.

★ Chicago's Lake Shore Drive as seen just prior to opening of extension north from Foster Avenue. See Foster interchange in foreground, with extension of drive northward to Bryn Mawr, and temporary Foster Ave. connection (scene of recent bottleneck) at left

The new link, according to Andrew Plummer, expressway engineer for Cook County, was expected to save an average of 3.2 minutes per northbound and 1.7 minutes per southbound vehicle. The reduction in peak volume accomplished was calculated to "take the curse" off the rush-hour jam-up, 30 per cent of the traffic ramping off at Foster. (See accompanying air picture.)

The first days following the dedication brought a jam described as even worse than the old one, the trouble merely being transferred to the new terminus at Bryn Mawr. The congestion was intensified by a combination of curiosity drivers and by the extra traffic load caused by the unseasonably warm, sunny weather.

The entire project will cost $5 million; the present partial project with cut-off into Bryn Mawr cost $750,000. Standard Paving Company of Chicago is the contractor. The county, city, state and park district of Chicago share the cost.

Rogers heads southeastern highway officials for 1954

W. H. Rogers, Jr., chief engineer, North Carolina State Highway and Public Works Commission, was elected president of the Southeastern Association of State Highway Officials at its 12th annual convention at Asheville, N. C.

He served as vice-president during the year just ended and succeeds E. J. James, chief engineer of the Louisiana Department of Highways.

W. M. Leech, chairman of the Tennessee State Highway Commission, was elected vice-president, and B. W.

Davis, chief equipment engineer, North Carolina, secretary-treasurer, succeeding J. A. Kinkead of Louisiana.

Nashville, Tenn., was chosen as the site for next year's convention.

Some 600 delegates attended the Asheville meeting. Principal speakers included: Grant Mickle, director, Traffic Engineering Division, Automotive Safety Foundation; Hal H. Hale, American Association of State Highway Officials; and A. H. Graham, chairman of the North Carolina Highway and Public Works Commission.

Heating pipes installed in Boston express roadway

Boston's new $25-million Aerial Highway now being constructed may serve as the model for the highway of the future. While most of the nation's modern roads are built for speed and safety, designers of the Aerial Highway are going a step further by installing heating pipes to melt snow and ice from all access ramps of the new thoroughfare. When completed, the Boston expressway will be the largest snow melting installation in the country.

The heated ramp pavement not only will protect motorists from dangerous skidding hazards created by freezing rains and snow, but also will eliminate a major cause of traffic congestion in winter. Wrought iron pipe grids are being embedded in each of seven ramps serving the new highway.

Although the individual ramps have their own snow melting system with pump, heat exchanger and pipe units, the total area served amounts to more than 161,000 square feet of concrete pavement.

More than 200 tons of small-size (1 and 2-in.) pipe is used in the systems. The pipes, welded into 10-ft. by 22-ft. grids, are arranged in series and buried in the concrete pavement.

To operate the systems, steam supplied by Boston Edison Company, is fed to heat exchangers. Water mixed with Ethylene-Glycol anti-freeze, is circulated through the heat exchangers and pipe networks. The heated concrete pavement prevents ice from forming and melts snow as it falls.

Each snow melting system is designed for automatic or manual operation—or for a combination of both. Thermocouples, sensitive instruments to measure temperature, are being embedded in various sections of the concrete to contribute to comprehensive study of the systems in operation.

The Boston Aerial Highway, is designed by architects-engineers Fay, Spofford & Thorndyke and the Commonwealth of Massachusetts Bridge Department.

$50,000,000 extension to Chicago shoreway studied

Hearings were held recently on the proposal to extend Chicago's South Shore Drive from 49th Street to Indiana Harbor, a distance of 8½ miles. The idea was considered at a joint meeting of representatives of the Indiana and the Illinois toll road commissions. The project would cost an estimated fifty million dollars.

Under the plan the road would be built partly on city park land and partly on lake-front fill, elsewhere skirting behind lakeside industrial plants. The line would be a vital link in the direct routing of traffic from Indiana, Michigan and the East.

The idea was approved by the Chicago city council in 1945, and might be built as a toll road in accordance with the recommendations of a citizens' advisory committee appointed by William Erickson, president of the Cook County board.

Speed control innovations planned for Ohio pike

Ohio turnpike commission engineers are investigating the possibility of special speed controls for the 241-mile road now under construction. A meeting with experts from the National Safety Council and perhaps other organizations is planned. A system that will flash reduced speed warnings in bad weather is wanted.

In event of fog, rain, snow or other hazards this system, according to a news report, would control driving by means of electrical flashers until such time as safe conditions were restored. "We're going to be aggressive and imaginative. We're not going to follow other safety patterns for the sole reason that they are accepted now," turnpike chairman James W. Shocknessy is reported to have said.

"Save the Signs"

The Idaho state highway department is issuing a plea to all highway users and others to "save the signs." The department's traffic division, which handles the manufacture and placing of signs, released figures showing that destruction to highway signs, in 1952, cost the highway user in Idaho $108,000.

Ellis Mathes, highway department traffic engineer, pointed out that much of the destruction was due to people using the signs for target practice. It was also noted that a large number of bent and twisted signs are found in many places, especially around night spots, undoubtedly due to some celebrant trying to demonstrate his strength.

The mutilated signs, that are not too badly damaged, are taken to the department's sign shop in Boise and renovated.

Miller pointed out that the state law provides that persons damaging signs are liable for their repair and replacement. "In several cases, we have been able to learn the identity of the person and through due process of law have been reimbursed for the damage.

"Each of those signs you see along the highway has been placed there for the protection or guidance of the motoring public and it should be the responsibility of every motorist to see that those signs are maintained in the best possible condition," Miller said.

★ This isn't reinforcing steel but a grid of heating pipes, to be embedded in the concrete for keeping Boston's new Aerial Highway snow and ice free

EDITORIAL

Small bridge plans

One of the most valuable pieces of publishing to come out of the Bureau of Public Roads in a long time is the new "Standard Plans for Highway Bridge Superstructures." Rickety narrow old bridges are danger spots and bottlenecks everywhere. This set of approved plans for typical short spans will be of particular help to county, township and small town governments, as a guide to economical and good design details in highway bridges.

Standards for short span bridges have been used by state and county highway departments since the early highway era and, like all American products, must be modernized from time to time to meet the latest developments in structural practices. These plans do just that by employing the latest thinking in bridge design. The purpose is to provide a guide for local engineers in developing their plans.

If one is seeking criticism, a possible point against such a publication might be found in a tendency to stifle further design evolution by making ready-made plans so easily available. But the user still has the responsibility of selecting intelligently from the complete range of design types represented, along with the proper design of the substructure. Much amateurish and uneconomical designing has been done in the small bridge field in the past. It still calls for careful analysis and judgment to select or adapt the best design for a given set of local conditions.

The bridge types represented, by the way, include the pre-stressed concrete types which are coming along so fast, offering local government agencies the economic advantages of manufacturing precast units in the shop or yard or near the site during off-season months.

Bureau of Public Roads

Many people in highway work are uneasy over reports and rumors coming out of Washington concerning the future of the Bureau of Public Roads. Even the many who heretofore have criticized the Bureau for duplication of effort with the state highway departments, would hate to see the Bureau headquarters cut down to where its ability to exert a leadership influence over national highway developments is threatened.

Commissioner du Pont in his talk at Pittsburgh outlined some of the policy changes and gave some assurance that things aren't going to pot in the Bureau.

Definitely announced is the consolidation of the Division of Programs and Design, formerly under the late H. E. Hilts, with the Division of Construction and Maintenance. Deputy Commissioner A. C. Clark will direct both wings under a new Division of Engineering.

While each wing of the consolidated department will be headed by an outstanding engineer, this consolidation raises a question. Should the forward looking evolutionary function of design be thrown in with the entirely different functions of construction and maintenance? It is hoped that functionally these two wings will be kept as independent as possible, while still maintaining the necessary coordination and interchange of thinking.

More broadly, it is to be wondered what the nation will gain by shrinking the administrative body that oversees national road development, at a time when this development is accelerating at a great rate and is faced with unprecedented problems vital to national defense and the general welfare.

Briefly noted . . .

First roadbuilding agency to fully recognize the importance of the truck and its driver is the Ohio Turnpike Commission. The Commission has announced plans for service areas along the 24-mile pike catering to trucks, each complete with modern dormitories and restaurant as well as mechanical facilities.

In Pennsylvania, where truck drivers who throng the pike 6,000 strong daily, the custom is for drivers to pull off on wide spots in the shoulders to sleep in their cabs. *Life* magazine recently dramatized a murderer who killed several sleeping drivers, following which trucks were going through in pairs or convoys.

●

The County highway conference held by the American Road Builders Association at Wisconsin Dells in September was one of the most valuable meetings of the year, in the opinion of more than one observer. County and local highway affairs need spotlighting nationally, and what better agency to see that this is done?

There is great pressure these days to put more and more of the roadbuilding money into toll roads and other arterial and urban facilities. Especially the inter-state system, which is so vital to welding the nation together, is getting strong backing by truckers and other interested groups. The capillary roads that tap the country's breadbasket are also vital, and must be considered in proper balance. This goes when making policy nationally, as well as when planning for the over-all needs of your state.

●

Even the most deluxe express highway between regions is actually a series of local connections, taking local traffic from town to town as well as carrying long trippers.

This fact—well recognized by highway planners, but often forgotten by politicians—was underlined by the paper given by Elmer Isaak at the recent ASCE annual meeting in New York. The 427-mile Thruway which will lead non-stop from New York City to Buffalo will be patronized by autos making an average trip of only 34 miles and by trucks averaging only 94 miles, according to this analyst.

This is a reminder that every toll turnpike now in a politician's mind's eye must depend largely on the function of spilling traffic into and out of the wayside cities it will skirt.

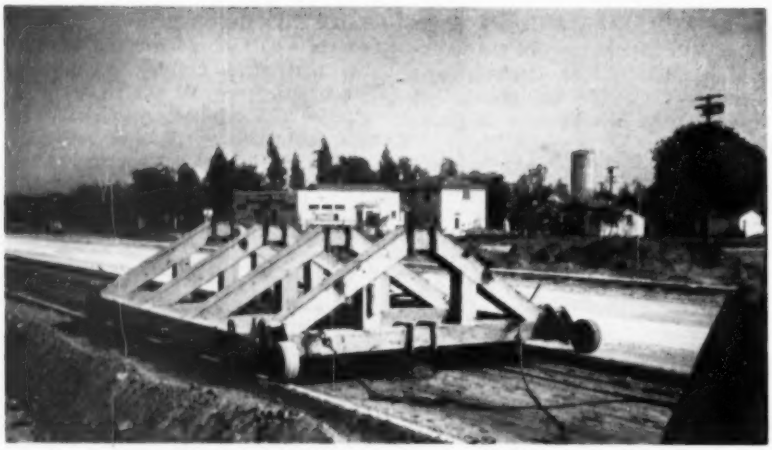
●

In New Jersey, the turnpike rules forbid truckers and motors from pulling onto shoulders for any purpose short of an emergency that prevents reaching the next service area. The officials have a good point: why spend huge sums to provide a limited access road, then let vehicles use shoulders indiscriminately? Uncontrolled reentry from shoulders into the high-speed traffic stream creates a traffic hazard as bad as that caused by "shoestring" roadside business development along free roads.

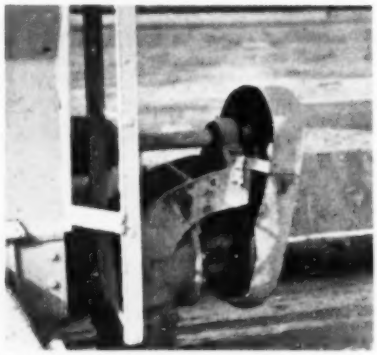
Control of access to restricted points is a prime purpose of toll expressway design. And such control must and will become a feature of all road design, rural or urban, for heavy arterial traffic or free roads. Access means from-the-shoulder as well as from the roadside or side road.

FREEWAY PAVING JOB . . . Emphasizes Difference

Contractor devised special equipment for several operations on Ramona Freeway project, involving cement treated subgrade. Dummy joints formed at 60-ft. intervals; intermediate joints sawed at 15-ft. spacing, to control shrinkage cracks.



1 Shop-built windrower took up 4 in. of subgrade for the cement processing



2 Cement was spread with a tanker equipped with metering device (shown at right)

3 Mixing train in operation for subgrade treatment

WHILE concrete paving with cement-stabilized subgrade is a well standardized product in Southern California, the methods of construction are far from cut and dried. An example of the ingenuities being exercised by the contractors to get greater efficiency is shown by Griffith Company of Los Angeles, who, beside using the typical "western" type of finisher and constructing California-style treated subgrade, also devised several special equipment units to speed the job.

This contractor's job, described and pictured here, consists of two adjoining contracts for a total of 3.4 miles of Ramona Freeway, in Los Angeles. The combined price of $5,100,000 included grading, storm drains and most of the underpass structures. These notes will cover only the subgrade and pavement for this 6-lane divided roadway.

The design includes a subgrade of granular material 8 in. deep, the top 4 in. of which is cement-stabilized with a cement factor of 3.2 per cent by weight. After trueing up the grade the contractor brought in the imported subgrade material, spread it full width over the grade, and compacted it with a 10-ton, 3-wheel roller along the lines of the road forms. Forms were then placed, form pins being driven by converted jackhammers supplied by a 500 cfm Ingersoll-Rand truck-mounted compressor.

Special Windrower

A power subgrader struck off the material after which the procedure was to pick up sufficient material from between the forms to make a windrow for cement processing. Windrowing was done by a special contractor-built unit 14 ft. in length, towed along the forms by a D8 Caterpillar. This machine (pictured) was heavily fashioned in the shop from scrap material. Its box girder frame was welded together using pieces of old wartime Blaw-Knox road forms. The scarifier teeth are from a Caterpillar 12 motor grader, as are the moldboard and diagonal sizing blades mounted underneath. The unit rides the form on steel wheels, raised or lowered to give the desired cut by means of a bolt and double nut. Two horizontal rubber-tired wheels ride the inner side of the forms to hold

between California and Eastern Methods

4 Contractor-built spreader laid out soil-cement

5 Segment roller gave subgrade initial compaction

6 Then came special skimmer, and power subgrader

7 Another "special"—rubber tired roller; final compaction

8 Emulsion for seal and cure, thus applied to subgrade

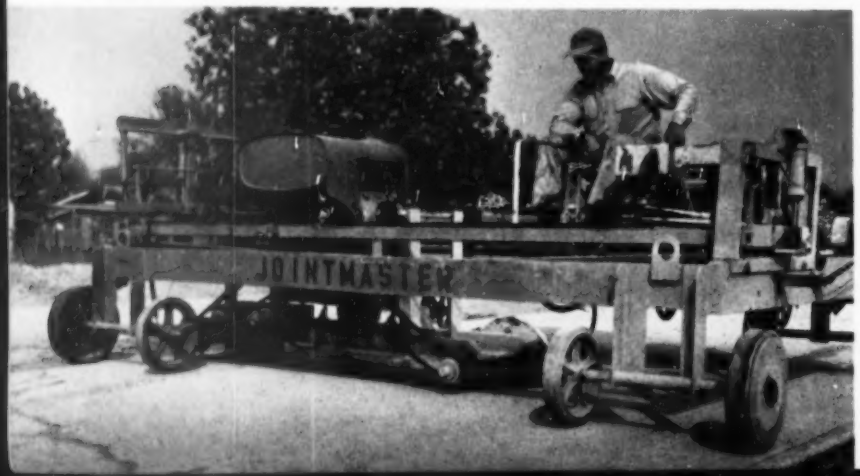
9 Motor crane moved equipment past bridges

★ 3,400-gallon booster tank for supplying paver tank, consists of converted bed of heavy Mack dump truck

★ Finisher with long wheel base, traveling over several hundred foot range, credited as factor in exceptional evenness of California's concrete pavements

★ (Left): Workers preferred long-handled edgers. (Right): Inserting tie bolts with impact wrench

★ Two-blade sawing unit cutting dummy joints



the unit in position and reduce strain on the form rail.

Cement was added to the windrow at the necessary rate of 16 lb. per lin. ft. by means of a 12-ton cement transport tank. A special metering worm operated by sprocket and chain from the regular feeding worm, assured uniform cement application by interlocking power take-off and transmission on the truck, which traveled in low gear for the spread.

Mixing was performed by a Wood mixer, drawn by a D8 and supplied with water by a Mack dump truck converted into a 3,400-gal. water tank.

A shop-built spreader equipped with diagonal skimming blades laid out the soil-cement mixture. The spreader was towed behind the mixer train.

Compaction was performed by means of two special rolling units, whose work was interspersed by a final "trimmer" pass using a special truck-drawn screed with diagonal blades.

The first rolling, immediately behind the spreader, was with a Buffalo-Springfield 8-ton asphalt roller having a segmented front wheel in place of the tiller. This type of roller with its semi-sheepsfoot action proved ideally suited for compacting the sandy mixture, which would have had a tendency to shove ahead of a smooth roller.

The trimmer then made its pass, then a Lewis subgrader for final shaping, following which another Buffalo-Springfield roller came into action, equipped with pneumatic tires in place of steel rollers. The tires, numbering three in front and four in back for split interval rolling, were old 10:00x20 truck tires of large wheel size, inflated to about 120 psi. This self-propelled unit gave the final compaction, which often tested up to 100 per cent or more, or well above the specified 95 per cent compaction.

The final subgrade operation also employed a contractor-built unit. This consisted of a form-riding, truck-drawn frame on which was mounted a row of spray nozzles from a bituminous distributor. The specified 0.20 gal. per sq. yd. of asphaltic emulsion curing seal was applied from a pressure tank and pump, mounted back of the truck.

Concrete Joints Sawed

The concrete paving procedure followed orthodox Western methods, the most noteworthy part being the sawing of joints, required in the specifications for this and for most California state concrete paving jobs today. The design of the 8 in. x 24 ft. concrete pavement included no expansion joints, but transverse dummy joints at 15-ft. intervals. The contractor was permitted to form every fourth joint, which was done by inserting a ¼ x 2 in. metal strip removed in advance of the last two finishing passes, this joint later being edged.

The procedure of forming a joint every 60 ft. was desired by the state to control initial cracking. Furthermore, sawing of green concrete has been found by this contractor to be more costly in blade wear than the sawing of the remaining joints, specified at 24 hours after pouring. The earlier sawing also has resulted in some spalling and tearing under the particular conditions of aggregate, mix design, and weather.

Sawing of the 12-ft. wide slabs was performed by a Jointmaster unit, manufactured by Concrete Sawing Equipment Co. This unit, which rides the forms, has two 12-in. saw blades of special alloy metal edged with industrial diamonds set in a powdered metal matrix. The complete joint is sawed in 6 ft. of travel, the blades working under water jets supplied from a truck-mounted pressure tank.

This unit turned out virtually perfect joints at 24 hours, and was reported to have cut as high as 3,000 to 4,000 lineal feet of joint per set of blades. The aggregates involved consisted of a granite gravel and sand from the San Gabriel Valley having a 35% loss at 500 revolutions in the Los Angeles rattler test.

A joint seal of Hunt rubber-asphalt compound (60% paving asphalt, 40% rubber latex) was applied with a pouring pot at the longitudinal joint adjacent to curbs only.

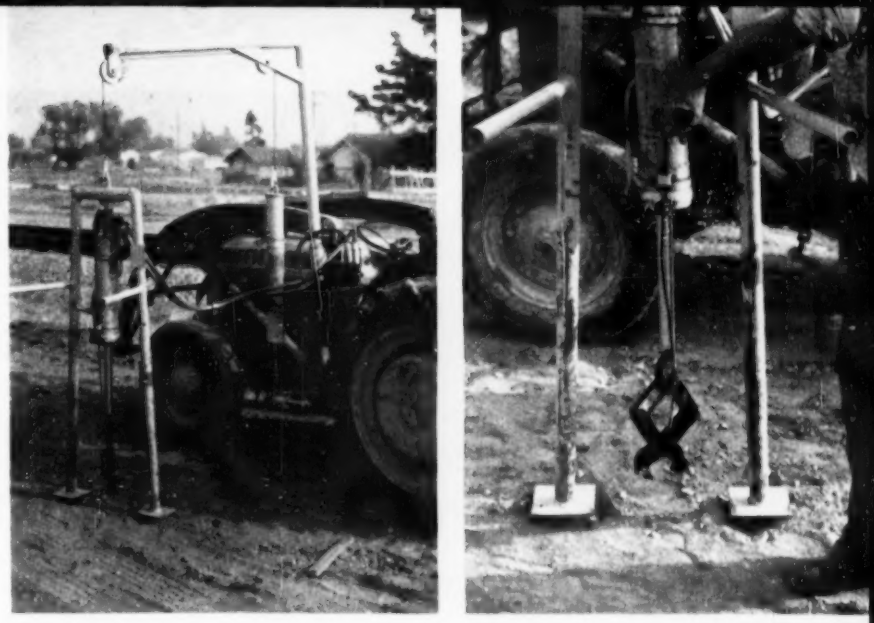
Concrete batching was performed by a 4-bin, fully automatic, electrically operated plant, designed and built by Conveyor Company, Inc., of Los Angeles. Cement was delivered by tanker with unloading screw. Four-batch trucks delivered to a Koehring 34-E dual-drum paver. A Jaeger spreader was followed with an old Jaeger-Lakewood finisher on which the contractor had mounted a special tamping bar. Located between the two screeds, this bar was actuated by means of oscillating crank action, operated by a second gasoline motor. The device permitted easy handling of low-slump concrete.

A Johnson float finisher completed the finishing, followed by a burlap drag and grey Hunt pigmented curing compound application.

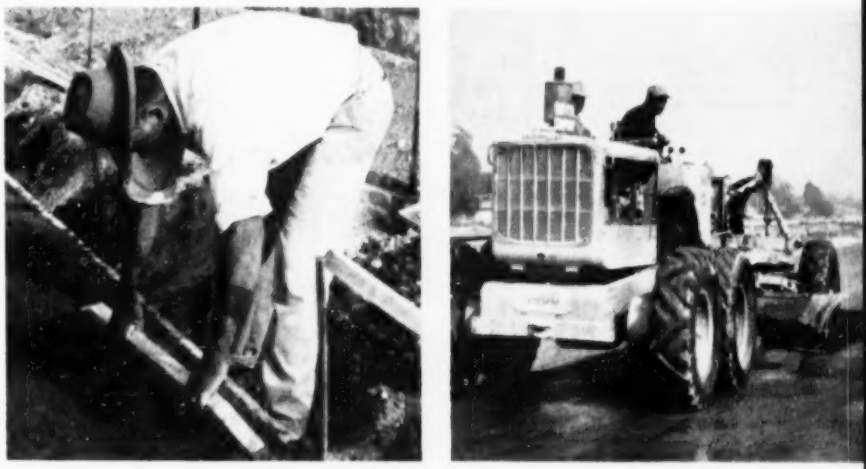
The 12-ft. pouring lanes on this project were keyed and tied with ⅝ x 15 in. bolts, held in place by a tie bolt assembly nut and square-headed capscrew inserted in the form rails. An Ingersoll-Rand air-powered impact wrench was used to insert bolts into nuts in the slab already formed.

In the work of form removal, the contractor also used a special pin puller which saved much labor and obviated the tying up of a heavier piece of machinery, as is often the case with this chore. The device consisted of a pair of oversize pliers which a worker set by hand over a bolt head. The pliers are a hydraulic

(Continued on page 74)



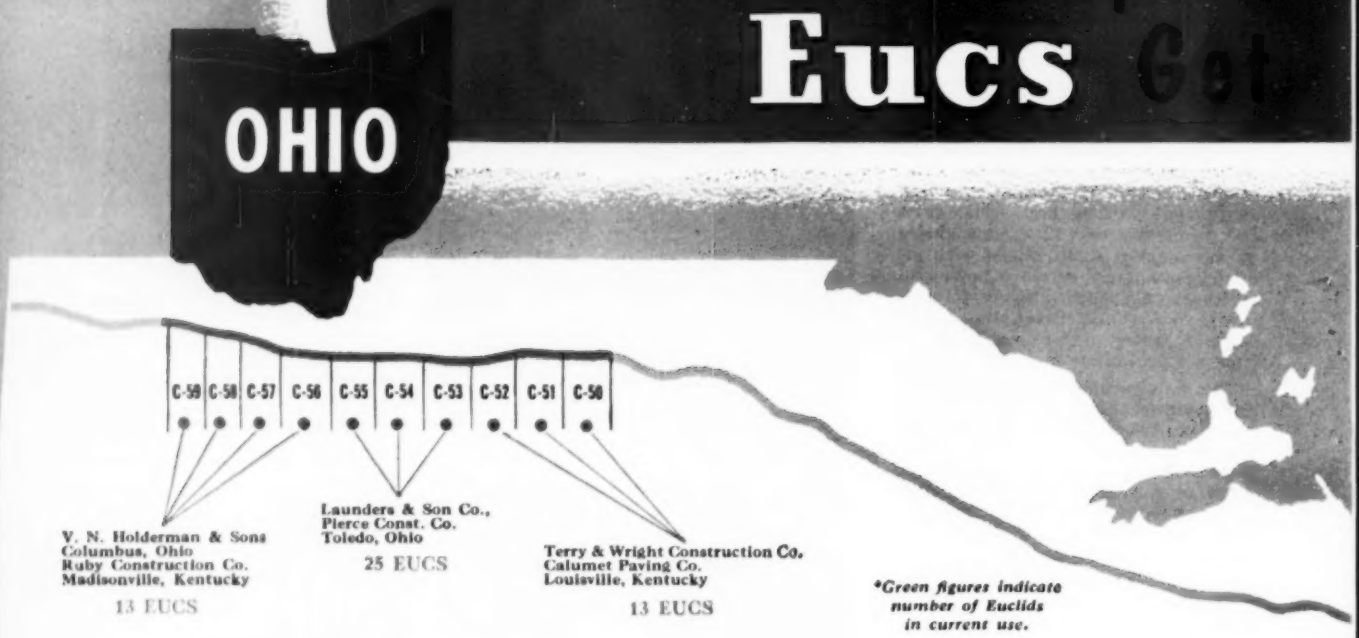
★ Special hydraulic "tooth puller" made quick work of pulling form pins



★ (Left): Shallow gutter with low rolled curb, a feature of the Ramona Freeway design. (Right): Special blade extension helped clean dirt out of gutter during the clean-up. Consists of sections of heavy cord-reinforced rubber matting, cut to gutter outline

★ Fully-automatic electric batching plant used by Griffith Company on Ramona Freeway job, in accordance with standard California practice

Another Turnpike Gets Eucs

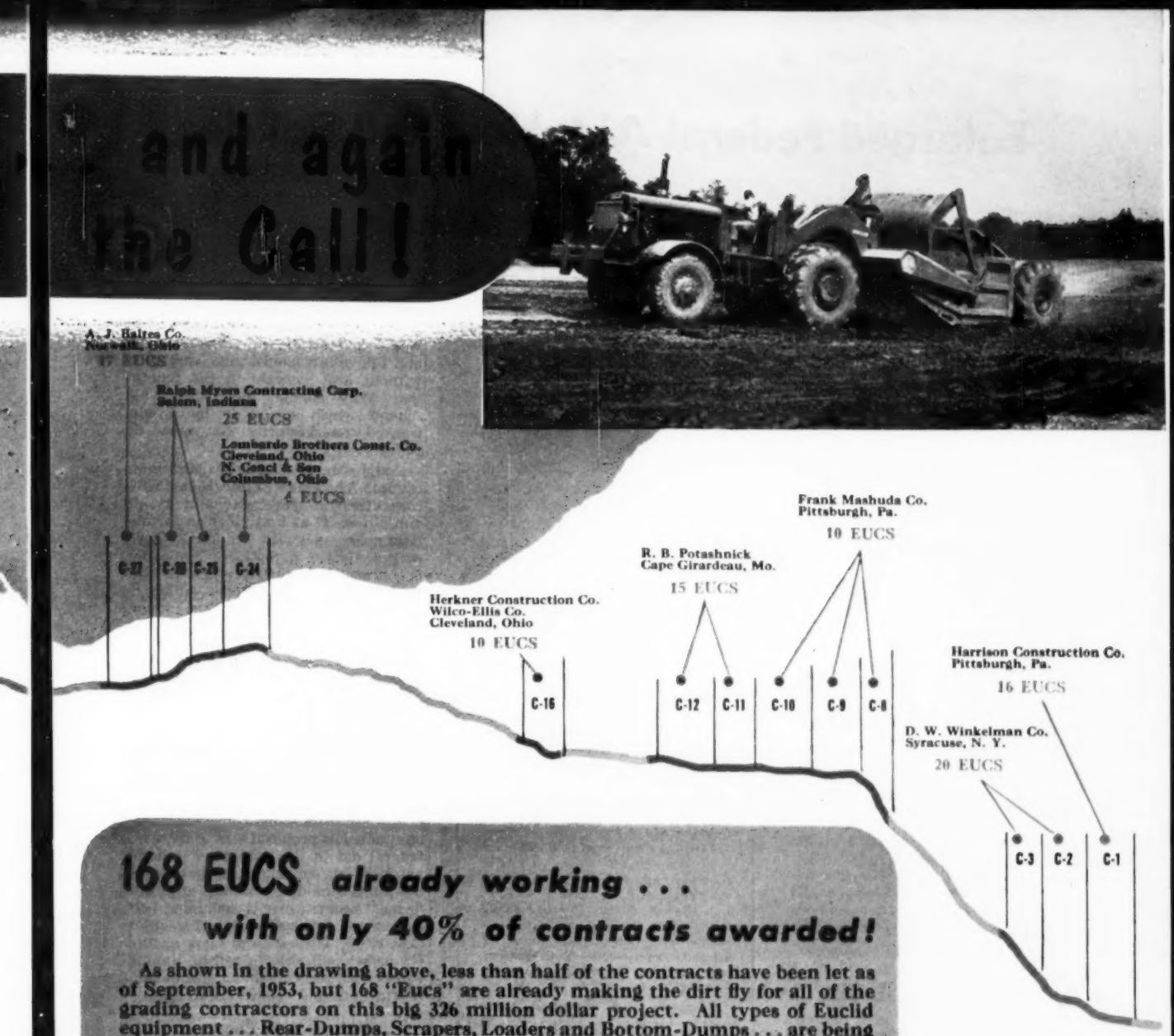


HISTORY REPEATS!

. . . it's "EUCS" on the Ohio Turnpike now!

The new 241 mile Ohio Turnpike, stretching across the state from Pennsylvania to the Indiana border is now under way. Although contracts for only about 40% of the project have been awarded, 168 "Eucs" are already moving earth and rock on the excavation and heavy grading, and many more will move on the job as the work progresses all along the way.

Just as most of the contractors on every new toll road built during the past 15 years . . . in Pennsylvania, New Jersey, Maine, West Virginia, New York, Oklahoma and others . . . have relied on Euclid equipment, contractors working on this newest turnpike are also counting on "Eucs" to get their earth moving done on schedule and at a profit.



168 EUCS already working . . . with only 40% of contracts awarded!

As shown in the drawing above, less than half of the contracts have been let as of September, 1953, but 168 "Eucs" are already making the dirt fly for all of the grading contractors on this big 326 million dollar project. All types of Euclid equipment . . . Rear-Dumps, Scrapers, Loaders and Bottom-Dumps . . . are being used according to the specialized requirements of every job along the way.

It's not mere coincidence that contractors on practically every big rush earth moving project . . . and on the smaller jobs, too . . . are almost unanimous in their selection of Euclid equipment. They know that Euclid is the pioneer and leader in the earth moving field and that "Eucs" are backed by a world-wide distributor organization with unexcelled parts and service facilities.

When your competitors have the benefit of high production at low cost provided by "Eucs," you need all of the profit making advantages that can be yours with Euclid equipment. Your distributor will be glad to supply all the facts, so get in touch with him right away.

The EUCLID ROAD MACHINERY CO., Cleveland 17, Ohio

Enlarged Federal Aid, New Toll Policies

—Urged at AASHO Meeting

Conflicting ideas presented by congressional leaders for future highway financing. Varied subjects considered by technical committees.

THE future role of the federal government in highway financing was one of the main topics at the American Association of State Highway Officials annual meeting, held November 10-13 at Pittsburgh. With the new session of Congress only a few weeks off, the utterances of Washington leaders were closely studied for trends in federal-aid thinking for the next biennium.

The position that Uncle Sam should immediately get out of the gasoline tax field, and leave such taxation to the states, was taken by Senator Edward Martin of Pennsylvania, who is chairman of the Senate committee on public works. The Senator while urging a $4 billion annual program of road building, and noting that we have fallen $40 billion behind in the task, voiced concern over the high national debt, high taxes and deficit spending in Washington. His talk follows the well-known Pennsylvania "party line" in holding for reduced federal participation in road work.

Senator Martin suggested, instead, that road financing be placed on a pay-as-you-go basis, through state taxes and the collection of tolls on existing roads, bridges and tunnels. He cited the rise of toll collections to a present $200 million annual level. To improve efficiency he advocated a reduction in the number of governmental units — now 46,000 — which have some jurisdiction over roads. Also the ending of diversion of state funds at the state level (now exceeding $200 million annually).

Enlarged Federal-Aid Asked

In contrast with Senator Martin's thinking, Congressman George A. Dondero (R. Mich.), chairman of the House committee on public works, declared that repeal of the federal gasoline tax would be a "tragic mistake." Proposals to abolish the federal Bureau of Public Roads "would result in chaos and confusion," he added. The present 2-cents federal gasoline tax produces $900 million annually, raising the federal income from motorists including excise taxes on tires, oils and vehicles to $2 billion annually. This compares with federal highway aid currently at $575 million annual rate.

"To repeal the federal gas tax would not mean more money for roads but less," said the congressman. "We could not expect the 48 states to add the 2 cents to their taxes—some might do so, while others would reject the idea. A substantial increase in the amount of federal highway funds, apportioned among the states, would at least be a partial solution, and I have introduced such legislation without any increase in the federal tax. Why change the federal-aid scheme which has, upon the whole, worked satisfactorily for over 35 years?"

Congressman J. Harry McGregor of Ohio, chairman of the House subcommittee on roads, declared as his aim "to assist as best I can in formulating an adequate federal policy" with respect to highways. This leader is concerned over the primary task of determining highway needs, then formulating a plan within the federal capabilities. The congressman cites a particular need of speeding the advance acquisition of road rights of way, saying that existing procedures are expensive, cumbersome and unrealistically slow in many instances. Attention to this phase is foreshadowed in coming federal legislation.

Increased federal appropriation for highways was also advocated by Senator Francis Case of South Dakota, chairman of the Senate subcommittee on roads. His proposal was to increase federal aid to the amount of federal gasoline tax collections. A portion of the funds should be reserved for roads to meet security needs, including belt routes and arterial outlets for cities over 10,000. Also, federal funds should be made applicable to toll or limited access road projects under specific authorizations and conditions, he said.

Johnson Heads AASHO

A. E. Johnson, chief engineer, Arkansas state highway commission, was elected president of the AASHO for the coming year. Other election details:

Vice-presidents: F. D. Merrill, New Hampshire; P. S. Turnbull, Florida; Gale Moss, Kansas; M. U. Watrous, Colorado.

Executive Committee: G. A. Hill, Connecticut (new); C. M. Ziegler, Michigan (ex-officio, past-president); J. A. Anderson, Virginia; R. H. Baldock, Oregon; F. V. DuPunt, Bureau of Public Roads; D. C. Greer, Texas; R. A. Harris, Mississippi; M. J. Hoffman, Minnesota; E. L. Schmidt, Pennsylvania; B. D. Tallamy, New York; M. U. Watrous, Colorado; F. R. White, Iowa.

Treasurer: G. H. Henderson, Rhode Island. Executive Secretary: Hal H. Hale, Washington, D. C.

★ A. E. Johnson, Arkansas—AASHO president-elect

DuPont Tells Changes

Recent changes in the Bureau of Public Roads were outlined by Commissioner of Public Roads F. V. du Pont, in his first major address since taking office last April. Economies totaling $400,000 during the first year have been achieved by organization changes. One purpose has been to bring the deputy commissioners into greater responsibility, with the development of a staff-type set-up. Another new policy has been to retire a number of over-age employees, to improve the promotion outlook for younger men. A report rendered by the management firm of Booz, Allen and Hamilton is under consideration.

The only major staff addition during the period since du Pont took office has been the appointment of Mr. Kaltenbach as solicitor, replacing Mr. Boykin, retired. The department of design has been consolidated with that of construction and maintenance, under a deputy commissioner. The Bu-

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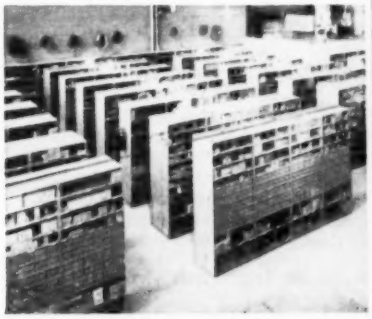
The construction equipment distributor has played an important part in helping to build the vast construction industry as we know it today. Too often the services of the distributor are taken for granted, but these services have much bearing on the contractor's profit and success.

The role of the distributor begins when a job is bid. He provides facts and figures on a moment's call on most any equipment. He stocks machines for prompt delivery. He knows job conditions within his territory and helps in applying proper equipment



★ Parts-in-stock—a time-saving cost-cutting Distributor service

for lowest operating cost. When a sale is made, he arranges the financial plan. Many a contractor has been given his start and guided down the path to prosperity by an intelligent and helpful distributor.

When the equipment goes to work, his role becomes increasingly important. The distributor's parts and service facilities can often mean the difference between profit and loss to the contractor. Genuine parts stocks are close to the job. Shop facilities are specialized for equipment service. Field service on-the-job adds countless hours of performance time. Distributor parts and service personnel bring factory approved methods to the equipment owner for lower costs and best results. Machine records are maintained to further speed customer service.

When you think of your equipment distributor, consider all of the things he offers to make the contractor's work more profitable. He is not only a selling agent, but an organization of specialists very closely geared to every phase of a construction project. Without the construction equipment distributor, the present day contracting industry as we know it could hardly exist. Hats off to one of the industry's most important groups!

(Advertisement)

LOOK AT THESE LORAIN-50 PROFIT BOOSTERS

HYDRAULIC COUPLING — Prevents shocks and stresses from backing up into mechanism and cables —reduces maintenance—increases output. No stall under any digging condition. Standard on only this 1-yard machine.

AIR CONTROLS — Air does the work on the "50" — crawler steering and Tread-Travel Lock use full air power. Air-assist available on hoist, crowd and retract.

4 CRAWLERS — Be "choosy" about your crawler. Select from standard, long, extra-long, and extra-long & extra-wide —to exactly fit your job. Rubber-tire mountings also available.

5 FRONT ENDS—Choose from shovel, crane, clamshell, dragline and hoe—all interchangeable. Your "50" can help you win many bids.

ANTI-FRICTION BEARINGS — Tapered anti-friction turntable rollers—anti-friction bearing mounted Swing Drums—anti-friction bearing mounted Hoist Drums.

Be "CHOOSY" when you buy a Shovel-Crane

Times have changed! Today, you can get most *any* brand you want—when you want it. Not long ago, perhaps you bought just any make of shovel-crane "because it was available". Now you can return to *selective* buying to get the most for your money.

In the 1-yard Lorain-50 "Series" shovel-crane class, as well as in the rest of the wide Lorain line, there are solid values and exclusive design features that pay off in profits. They are not just "gimmicks" to confuse the buyer—but are an honest-to-goodness combination of values that you won't find in any other 1-yard class machine.

Be *"choosy"*. Make sure your shovel-crane investment will pay you greatest profits. Choose from the complete Lorain line —from ½ to 2-yard classes—at your Thew-Lorain Distributor.

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THEW LORAIN. 1-YARD 50 CLASS

$900 Million Annual Federal Aid Sought

- An annual highway Federal-aid authorization of $900 million, as compared to the present $575 million, was recommended for fiscal years 1956-57 by the American Association of State Highway Officials at its annual meeting.
- The AASHO policy statement would authorize $250 million for the Interstate System, $292.5 million for the Primary, $195 million for the Secondary and $162.5 million for the Urban Federal-aid system.
- The state highway officials went on record as favoring continuance of the present 50-50 machine principle for the primary, secondary and urban ssytems. However, they have recommended that the Federal government assume 75% of the cost of improvement on the Interstate System, with the states providing the other 25%.
- AASHO would also apportion Federal funds to the various states for the Interstate Systems on the basis of population alone instead of under the present formula which takes into consideration three factors—population, mileage and area.
- Federal motor fuel excise tax collections in 1953 are expected to approximate the $900 million Federal-aid authorization recommended by AASHO for fiscal years 1956-57. However, under present law, the Federal motor fuel tax is scheduled to drop from 2 cents per gallon to 1½ cents per gallon on April 1, 1954.
- In other action, AASHO recommended that the states be permitted to use the Federal-aid funds allotted to them for research and planning to help finance road tests sponsored by the states and industry groups. This recommendation is reported to be aimed at facilitating the undertaking of the AASHO road test which tentatively has been planned for construction and operation as a part of the relocation and reconstruction of U. S. Route 6 in Illinois.

reau's research program has been evaluated by a committee of highway engineering leaders, with a view of making it more effective.

Charles M. Ziegler, Michigan highway commissioner, in his presidential address before AASHO, joined in warning against the loss in highway revenues that would certainly occur should the federal government lessen its road support. The states would not necessarily add correspondingly to their gasoline taxes as advocated by Senator Martin, he said.

The highway officials, he continued, have sought the return of an increased percentage of the money which the federal government is now taking from the motorist. A substantial increase in funds for the federal interstate system, in particular, is hoped for under a formula that would give each state a share on a population basis except that no state receive less than 0.75% of the total collected.

Better Concrete Methods

How road contractor personnel in Pennsylvania were given a schooling in methods of producing quality concrete was told by W. H. Hermann, chief research engineer, Pennsylvania department of highways. Mr. Hermann's paper was given at the Materials Committee session. Three years ago the Pennsylvania department changed its contract procedures to throw more responsibility on the contractor for concrete mix design and control. This was done, said Hermann, to get the contractors more interested in contributing their share of effort toward quality work.

To further this aim, a series of schools has been given throughout the state, each attended by 50 to 60 contractor foremen and superintendents and lasting two days. The "students" were given an actual example of mix design to work out based on typical aggregate samples.

★ D. C. Greer, State Highway Engineer, Texas, recipient of the George H. Bartlett Award for outstanding contribution to highway advancement—given at the AASHO convention at Pittsburgh under joint sponsorship of the Association and the Highway Research Board

Heretofore the contractors often have been suspicious of the engineer's mix design, especially when a high cement content was specified. These schools have helped the contractors see for themselves the great variation in cement factor necessary due to the different local aggregates. They also have demonstrated the reasons for the various specifications and design requirements, and given everyone a brush-up on concrete fundamentals generally. The contractor associations have aided in this program and supplied technical assistance.

Better Pipe Test

A more workable test for acceptance of reinforced concrete culvert pipe was described by R. R. Litehiser, chief engineer, testing and research laboratory, Ohio department of highways. The use of larger and heavier pipe has overtaxed the capacity of the conventional three-point compression testing equipment in most laboratories. To meet this limitation and eliminate much laborious detail, a procedure has been developed in Ohio for cutting cores from the pipe wall and testing them in compression. The core tests have been evaluated against flexural 3-point tests. The position of the reinforcing steel is also checked from the cores. A $150 portable coring machine, commercially available, has been found satisfactory for this work.

Asphalt Transport Problems

The problems of controlling the bituminous products delivered to the road job were given a lively discussion at this committee meeting. H. L. Lehmann, testing and research engineer, Louisiana, led with an outline of the problem in his state. By the time an OK is received from a laboratory sample, the tankful of material in question may be already incorporated in the mix and placed on the road.

The problem is particularly troublesome in this state, where refineries supply most materials direct by transport without need for reheating on the job. Occasionally the transport may have a batch of material contaminated from a poorly cleaned supply pipe or valve at the refinery; or the transport tank or job storage tank may be contaminated by remnants of material of a different grade.

Conversely, sometimes the sample taken for testing is contaminated, but the materials shipped are OK, in which case the job is held up unnecessarily until the matter is ironed out.

In discussion, F. F. Havey of Indiana told of his state's system of "immediate usage," in which a material source is put on an approved basis after five samples have been taken covering a single source and grade. The material can then be used without further routine testing, and the staff is so notified. This system in conjunction with daily test samples and weekly shipment lists worked fine for

(Continued on page 70)

"There's only ONE reason!"

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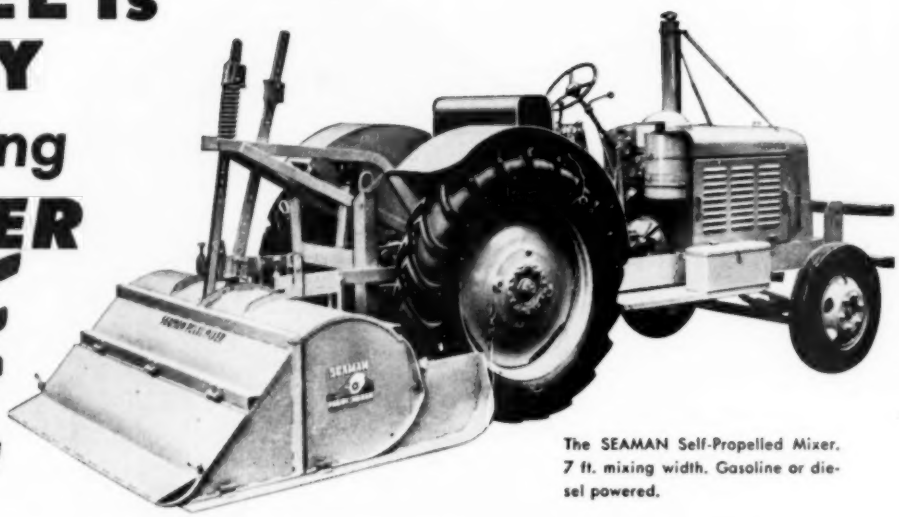
GRAVEL is COSTLY and getting SCARCER

SAVE IT with a SEAMAN MIXER



The SEAMAN Self-Propelled Mixer. 7 ft. mixing width. Gasoline or diesel powered.

Gravel-dollars for road construction are wasted in two ways:

1. Where early base failure (even when binders are used) causes excessive and costly reconstruction or repairs.
2. In actual loss of loose stone "kicked" into ditches by traffic on gravel roads.*

Both cases are caused by gravel segregation. Segregation always occurs when aggregates are pushed, transported or moved. The fines sift to the bottom, coarse stone works to the top.

The SEAMAN in its mixing action *blends* and *places* the coarse and fines so that each size — from dust to the largest stone — are in the same proportion throughout the base. The stones are keyed and interlocked and are securely mortared in by the fines which fill the voids. In the same operation binder of any type may be completely and thoroughly mixed-in.

Segregation is completely corrected, loose gravel is eliminated and the base provides higher load-bearing value, greater durability and far better resistance to weather.

* Gravel "kicked" into ditches can be recovered with the SEAMAN. Many users report $300 up to $500 per mile as the value of salvaged aggregates. Send for Seaman Gravel Bulletin for complete description.

Typical wastage of costly gravel caused by lack of mix-blending to correct segregation.

Segregation of gravel when mixed with binder led to sub-base failure, and consequent break-up of the pavement.

Seaman Bulletin TPS tells complete story of aggregate segregation and its correction. Describes SEAMAN TRAV-L-PLANT and Self-Propelled MIXER. Full specifications. Send a postcard for your copy — now.

SEAMAN MOTORS Inc.

291 N. 25th • MILWAUKEE, WISCONSIN

dynamic new engine gives the popular D Motor Grader increased work power

The thousands who own Allis-Chalmers Model D's know the ability of these versatile machines to do outstanding work on both construction and maintenance jobs. Now — with extra power and added features — the Model D sets even higher performance standards in the low-cost grader field.

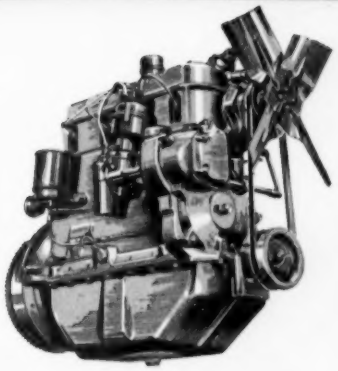
Dynamic New Power-Crater Engine gives the Model D reserve power to : (1) handle the same loads in higher gear or bigger loads in the same gear, (2) increase road speeds, especially where there are grades, (3) reduce need for shifting, thus lengthen clutch life, (4) give better all-round maneuverability. There's plenty of power to crowd while loading with the rear-end loader. Engine throttles down to half speed *and still does the same job* — on low-speed work.

Leaning front wheels* enable the Model D to handle new jobs . . . counteract side-draft on ditching and bank cutting.

Power circle turn* permits easy positioning of blade from operator's seat. When finishing subgrade or blacktop, for example, moldboard can be readily rotated without disturbing road surface.

These and other big-grader features — such as ground-gripping Tandem Drive, ROLL-AWAY Moldboard, Tubular Frame and Power Controls — combined with extra power make the Model D the accepted leader in the low-cost grader field. Ask your Allis-Chalmers dealer to demonstrate on your own job.

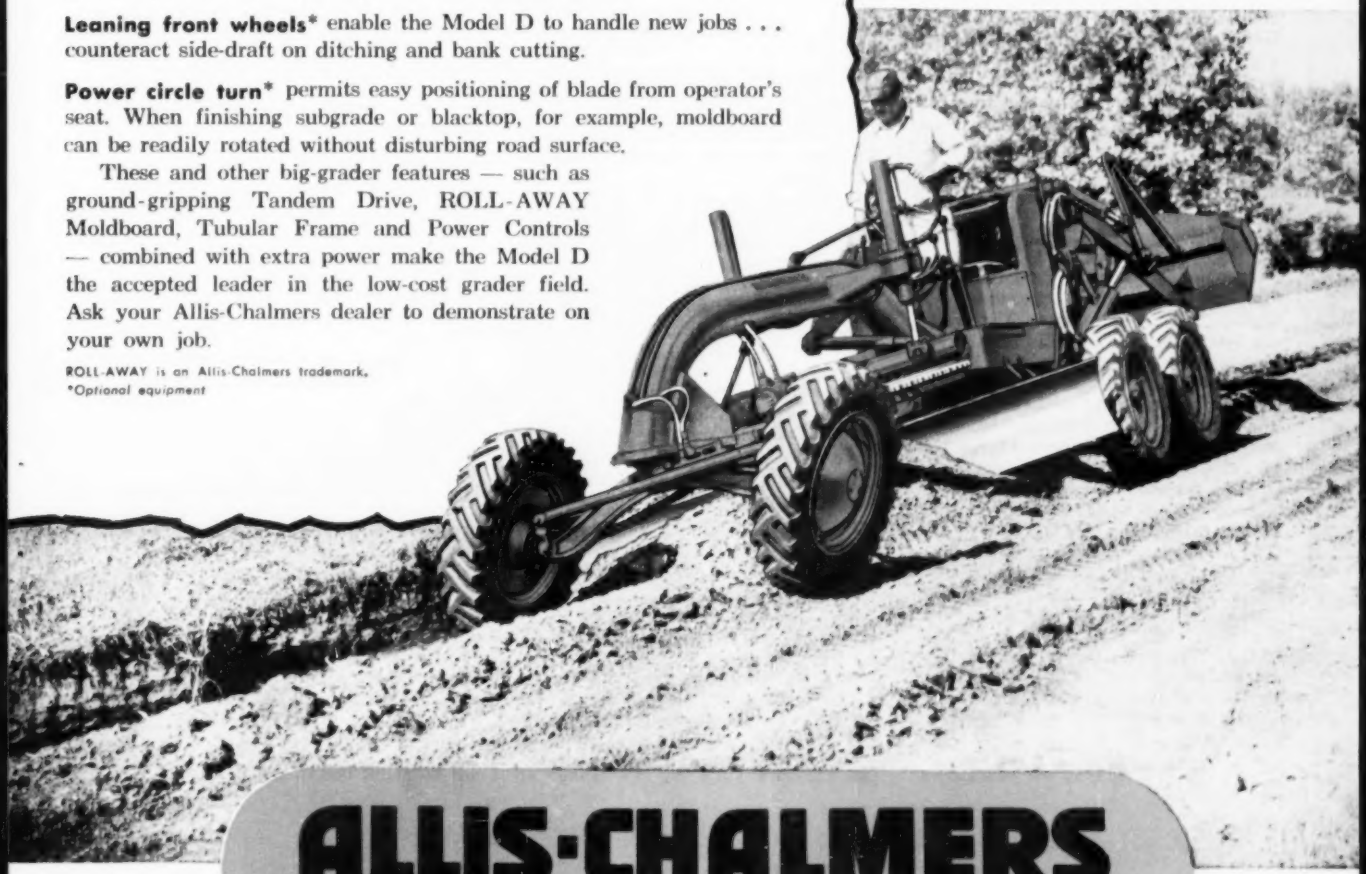
ROLL-AWAY is an Allis-Chalmers trademark.
*Optional equipment



POWER-CRATER Engine brings *truly modern* power to the Model D

This new engine boosts power while using less fuel per horsepower. It obtains high-octane performance when using regular gasoline. Only by watching a new Model D work can you fully realize what this truly modern engine adds to its performance!

Weight: 8,800 lb. (bare) • Brake Horsepower: 50
4 Speeds forward to 25.6 mph.
Reverse Speed 3.3 mph.



ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

General Reybold of ARBA Urges

A 10-YEAR expanded federal-aid program to improve the nation's major highways was urged by Gen. Eugene Reybold, executive vice president of the American Road Builders' Association.

Addressing the annual convention of the Carolinas Branch, Associated General Contractors of America, an affiliate of ARBA, he suggested that Congress authorize appointment of a joint committee of the Senate and House to conduct a thorough investigation of the entire national network of highways, including the federal-aid system of interstate, primary, secondary, and urban highways, together with a concurrent study of ways and means for financing requirements for the correction of deficiencies.

The speaker commended the 35-year record of the U. S. Bureau of Public Roads in administering the federal-aid highway program and said it would be "the height of folly" to consider seriously any curtailment of its services. He called for continued and increased coordination between federal, state and local governments in solving the highway transportation problem.

More Construction Needed

As contractors, continued the General, you know that the index of highway construction has risen annually since World War II. It is estimated by the Bureau of Public Roads that a new high of $3,243,000,000 for construction will be reached this year—a $330 million increase over last year—and trade forecasts are for a continued upswing next year. In addition, maintenance expenditures increased from $1,611,000,000 in 1952 to an estimated $1,672,000,000 this year. Everything considered—construction, maintenance, administration, interest on bonds, and state highway police—total highway expenditures for 1953 will probably exceed $5,450,000,000. These figures represent enormous outlays of public funds but, even so, they do not begin to approach a satisfactory investment to meet deficiencies. In view of the fact that improvements never have caught up with the highway deterioration that developed during World War II and the fact that we now face an exasperating traffic congestion that is a direct economic drain, we are woefully remiss as a nation in not tackling road construction on a really effective scale.

Financing of an expanded program is, of course, the big issue. As I pointed out in testifying before a congressional committee in July, 1953, statistics show that highway transportation, in all its phases, accounts for approximately one-eighth of our gross national product, which last year reached an all-time high of $360 billion. This means a contribution of some $45 billion to the general welfare of the nation—a substantial contribution, to say the least, and strong indication that the nation's wealth is sufficient to support an adequate highway program at all levels of government. It seems clear that we have an adequate general revenue potential for a vigorous, expanded construction program. The main difficulty lies in our failure to search out and develop financial techniques to meet the requirements.

States are turning to self-liquidating toll roads for part of the answer. Twenty-five states now have legislative authority to build toll roads; 9 states now have them in operation; and others are in construction in 4 states. Nine hundred miles of toll roads are now in use; 1,000 miles more are being built; and 477 miles more are authorized for construction. These are expressways of modern design that, thus far, have been eagerly used.

We are happy to see fine roads constructed and used under any sound financing system. States and communities, however, cannot hope to satisfy more than a small percentage of their street and road requirements through financing by tolls.

The Senate Subcommittee on Public Roads conducted hearings this summer on proposed legislation to permit the use of federal-aid funds in the construction of toll roads. In testifying before the subcommittee, I said that the proposal merited consideration but that it ought to take its place as a part of a broad, over-all program—that toll roads cannot be regarded as a panacea but rather can be accepted as a limited development. Further, I suggested that construction of major limited-access highways by the toll method of financing should be coordinated and integrated with the national system of interstate highways and become a part of that system. And, finally, I suggested that Congress consider the financing of toll roads with federal-aid funds as only a part of the immeasurably larger problem of providing adequate highways for the nation.

Expand Federal-Aid

No organization in the country is more desirous than the American Road Builders' Association that Congress appropriate realistically for an expanded federal-aid highway program. No credence nor support can properly be given to the charge that 17 consecutive congresses and 5 successive presidents have been following an unsound policy in continuing federal-aid to the states. Any such philosophy would be amazing in the light of the accomplishment record of 35 years of federal-state-community cooperative programs developed and administered by the Bureau of Public Roads. But it now appears to be enmeshed in broad, sweeping designs to decentralize federal authority in general.

A new 25-man Commission on Intergovernmental Relations has been created and is now studying the whole problem of federal and state responsibilities. It is due to report to Congress not later than next March 1 on desirable fields for decentralization of federal authority. The study includes inquiry into the federal-aid highway program. Therefore, it directly concerns you.

Also, of possible concern to you will be studies by the new Commission on Organization of the executive branch of the government, headed by former President Herbert Hoover. This is planned as a protracted investigation and presumably its recommendations will come after the Intergovernmental Commission has reported.

Surely, more efficient government

"Realistic" 10-Year Road Program

at lower cost is a desirable goal. But, to narrow our sights to the highway picture, it seems the height of folly to seriously consider abolishment of the quality services of the Bureau of Public Roads or to substantially curtail the cooperative federal-aid program which has been carefully developed over the years.

You have every right to a selfish interest in the continuation and expansion of the program. It has beneficially served all phases of highway contracting. Ninety-nine percent of all federal-aid projects are constructed by the contract method. If I may make a personal observation at this point, I had experience with the Corps of Engineers during the last war handling about $13 billion of work by contract. I knew before and I learned better then that, with rare exceptions, it's the only satisfactory way of getting a job done. I remain a consistent and persistent champion of the contract method!

Aside from the obvious responsibility of the federal government to contribute to the cost of roads that can be equitably charged to the general welfare, there is the broader need for continued coordination between federal and state governments. The extensive research activities of the bureau, carried on, in most instances, as cooperative projects with the states, the Highway Research Board, the American Association of State Highway Officials, and other representative and public service organizations are of inestimable value not only to road builders but to all administrators, technicians, legislators, and the public generally.

Deficiencies Are Challenge

Over the years, the federal government, through the objective efforts of the bureau, has mapped the federal-aid system, consisting of the major arterial roads of the nation, including interstate, primary, secondary, and urban highways. I'll not labor details on this, except to emphasize that approximately two-thirds of the 664,000 miles of the system are deficient. Only one-fourth of the 37,800 miles of the interstate system, alone, meets required standards. At today's costs it would require in excess of $11 billion to bring the interstate system up to standard and $40 billion to correct deficiencies of the entire federal-aid system.

It's certainly true that these deficiencies constitute a challenge to do a great deal more in the field of federal-aid, and to develop a prompt formula for financing. But that challenge should not be permitted to open the door for loose and ill-founded charges aimed to depreciate the basic soundness of the Federal-aid program.

10-Year Program Needed

The present arrangement for cooperative federal-state programing and financing respects the rights and interests at both levels of government. The Bureau of Public Roads, I believe more than any federal agency, has always turned to and depended on cooperative methods in its administration. You know that that spirit has permeated associations like our own and you also know that we have found a wealth of advantage and mutual benefit in our joint undertakings. As an example, we have an active ARBA-AASHO Joint Cooperative Committee developing a highly important report on highways maintenance work by contract. Just a few weeks ago, the ARBA unit of this joint committee completed its recommendation for submission to the AASHO group. The recommendations deal with specific items covering the furnishing of materials and laying of surfaces, grading and drainage, bridge painting and repair, and allied matters.

That is a subject in which you are keenly interested and I think it is a good example of teamwork in policy-making.

With the reconvening of Congress in January and the subsequent submission of legislative recommendations by the executive branch, we should have a clearer idea of what may develop in planning and paying for the nation's highways that are so desperately needed. As far as ARBA is concerned, we shall advance our suggestion made this summer to the Senate and House sub-committees on roads that the time is now ripe for a re-evaluation of the federal-aid highway program with a view to a definite determination of its future role in support of the nation's economy and the national defense. We suggest that Congress authorize appointment of a joint committee of the Senate and House to conduct a thorough investigation of the entire national network of highways, including the federal-aid system of interstate, primary, secondary, and urban highways, together with a concurrent study of ways and means of financing requirements based on a 10-year program for the correction of deficiencies. With the information now available in the Bureau of Public Roads and the state highway departments, and that which has already been accumulated by the Public Works Committees of Congress, it would appear that such a joint committee could produce the right answer within a limited period of time.

We are firmly convinced that a bold, realistic 10-year program providing for a stipulated annual expenditure for new highway construction is the goal to be sought. Such a long-term, federal-aid program, authorized by Congress, would be immensely helpful to state highway departments, enabling them to plan well into the future. Additionally, it would establish the kind of a stable work load that would permit contractors and others in the highway field to proceed in their competitive operations with confidence. Program rigidity is not desirable, of course, but a reasonable long-range stability should result in lower costs and increased construction efficiency.

With this thought in mind, we will lend our organizational efforts to the task of presenting the highway facts objectively. I can assure you of this—we at ARBA will be constantly alert and ready to serve your interests to the best of our ability. Working together, we shall press vigorously for an equitable, long-range national program that will command the support of federal, state and local governments and the general public.

DISCHARGES CONCRETE anywhere

KOEHRING 16-E *twinbatch*®

mixes and pours concrete for buildings, pilings, bridges and culverts . . . paves highway and airport strips . . . batches into trucks . . . discharges concrete into overhead forms, hoppers, chutes. It's never "grounded". Elevating boom reaches up and out 60° . . . bucket discharges at a height of 21 feet (higher with special boom). Power-controlled boom also swings in a 160° arc . . . is self-locking, holds in any position for accurate spotting and discharge.

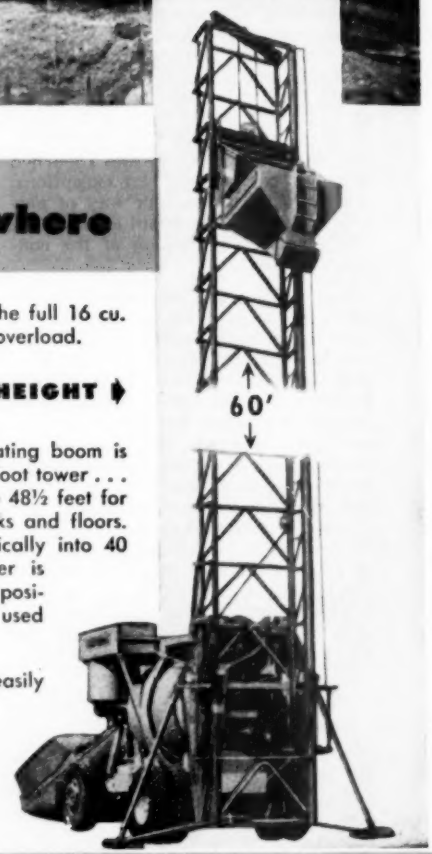
CONTROLLED-DISCHARGE BUCKET

dumps anywhere along the 25-foot boom. Clamshell-type door on bucket is hydraulically operated . . . can be opened or closed at any time for gradual discharge. Water-level capacity is 24 cu. ft. That's more than ample to hold the full 16 cu. ft. batch of concrete, plus 10% overload.

48½-FT. DISCHARGE HEIGHT WITH TOWER

On the Koehring 16-E, the elevating boom is interchangeable with a 40 or 60-foot tower . . . gives you discharge heights up to 48½ feet for pouring high columns, piers, decks and floors. Hoist bucket discharges automatically into 40 cu. ft. overhead hopper. Tower is raised, or lowered into carrying position, by the same hydraulic ram used on elevated boom.

This versatile Koehring 16-E easily mixes and distributes up to 50 cu. yds. of concrete per hour. Also check its 6 m.p.h. rubber-tired mobility. Ask, too about Koehring 34-E *twinbatch*.



SEE YOUR KOEHRING DISTRIBUTOR FOR COMPLETE FACTS

KOEHRING *twinbatch*® PAVERS

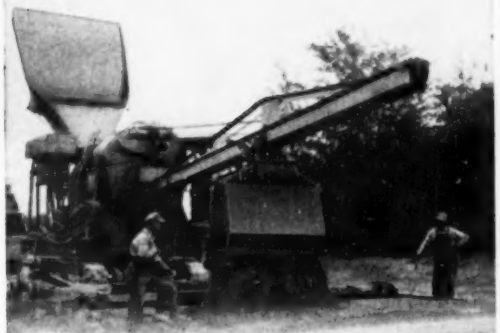
FINISHERS • CONSTRUCTION MIXERS • CRANES • EXCAVATORS • DUMPTORS® • MUD-JACKS®

CK337

KOEHRING Company, Milwaukee 16, Wisconsin Subsidiaries . . .

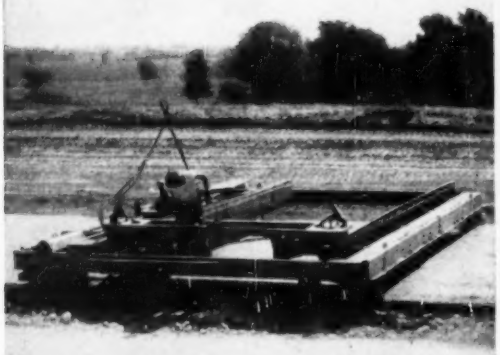
BUCKET TRAVELS 183 FT. PER MIN.

on horizontal boom (92' per min. elevated) . . . pours controlled batch anywhere along boom. Simultaneous bucket travel and boom swing speed distribution with 16-E.



BIG-PRODUCTION 34-E *twinbatch*

hits top output of 86.7 batches an hour (60-second mixing time). This reserve production capacity picks up lost time from normal delays, assures fast schedules.



"TIMELY", PRECISION-FINISHING

Koehring Longitudinal Finisher can operate at almost twice the speed of a 34-E paver, produce mechanically-accurate slabs, 8 to 30', with uniform crown transitions.

. . . JOHNSON • PARSONS • KWIK-MIX

9¾ feet per minute with 250 Trenchliner®

With 30 digging feeds, Parsons 250 Trenchliner produces up to 9¾ feet of clean-cut trench per min. . . . digs 16" to 42" wide, up to 12½ feet deep . . . cuts within 11" of either side. Reversible spoil conveyor shifts through machine by power in less than 1 min. to dump right or left. Constant discharge height speeds loading into trucks. Larger and smaller models are also available . . . contact your Parsons distributor now.

PARSONS • Newton, Iowa
(Koehring Subsidiary)

9 ft. discharge height with Tower Loader

This Kwik-Mix Tower Loader fits 11-S and 16-S Dandie® concrete mixers, discharges at 9'-1" into trucks, overhead hoppers, or stockpiles. Bucket holds full batch, is powered by mixer engine and dumps automatically at top of tower. Also available for Kwik-Mix No. 10 and 14 bituminous mixers. Get complete information from your Kwik-Mix distributor, or send for literature on low-cost, time-saving Tower Loader today.

KWIK-MIX • Milwaukee, Wis.
(Koehring Subsidiary)

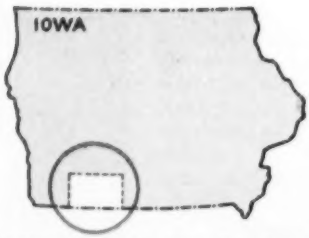
254 to 1321-bbl. Johnson cement plants

Johnson single silos: 254 to 611 bbls. Have gasoline or electric screw conveyor and bucket elevator. Also, receiving hoppers for trucks, box-cars, hopper-bottom cars. One or two 1000-lb. batchers can be used. Larger batcher, added leg and elevator height available for charging mix-trucks. Second silo at ground level increases capacity to 1321 bbls. All silos 1-piece, all-welded, 11 or 12' diameter. Have aeration, bin signals.

C. S. JOHNSON • Champaign, Ill.
(Koehring Subsidiary)

269

Taking Iowa



RINGGOLD COUNTY has 935 miles of county roads. This is the location of farm to market road construction done by the International Crawler fleet of Easter & Schroeder, Inc.

Pick Your Site and Set Your Hour...
We'll Demonstrate Our Tractor's Power

"IDEAL FOR FARM-TO-MARKET ROAD CONSTRUCTION," say Joe Easter and Don Schroeder (above). "In our eight month's working season, our five TD-18A units, with the sixth as a pusher, moved approximately 540,000 cubic yards, with minimum downtime."

ROAD BUILDING PRODUCTION LINE! Part of the Easter & Schroeder fleet of International crawlers on a regrading job in Ringgold County, Iowa. On this seven-mile stretch they moved 78,000 cubic yards in three weeks' time. *"We move it that way all the time,"* say the owners.

to Town

Farm-to-market roads get big boost fast from the International Crawler fleet of Easter & Schroeder, Inc.

The dirt flies when Easter & Schroeder, Inc., move in with their fast, powerful fleet of International crawlers . . . and Iowans can get to town and back in time to do the milking. For these Griswold, Iowa, contractors specialize in farm-to-market roads in the tall corn state.

Take the seven-mile job in Ringgold County, Iowa, you see here. In three weeks' time, Easter and Schroeder moved 78,000 cubic yards of dirt to give the road a 24-foot top on a 66-foot right of way.

Easter and Schroeder came to this Ringgold County job from one in Taylor County, where they moved 35,000 cubic yards of dirt on a two-mile stretch, completing the job in six 11-hour days.

"After 25-years' experience working in dirt, we settled on a crawler fleet one hundred per cent International," say these contractor partners. The fleet now consists of six International TD-18As with scrapers and 'dozers and a TD-14A with tamping roller.

Do you want speed and dependable economy under tough conditions? Then get in touch with your International Industrial Distributor, for all the facts on Power that Pays!

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILL.

POWER THAT PAYS

INTERNATIONAL

INTERNATIONAL HARVESTER

SEVEN GREAT INTERNATIONAL CRAWLERS... EACH WITH MATCHED EQUIPMENT FOR EVERY JOB

★ (Left scene): Looking off the Scioto River Bridge near Portsmouth, across the "bottoms." New high-level west-bound roadway at right; ramp brings east-bound traffic up from old low-level road at left

★ (Right scene): In distance is the underpass which takes old low-level road under new high road

"High-Low" Roadway for Ohio Floods

Approach to Portsmouth, Ohio, across Ohio River "bottoms" given novel re-design as result of economic study balancing community loss from periodic flood blockage against reconstruction costs.

By H. R. Craig

Chief Engineer, Bureau of Construction
Ohio Department of Highways
Columbus

U. S. ROUTE No. 52, in approaching Portsmouth, Ohio, from the West, traverses the Scioto River "bottoms" near its mouth with the Ohio before crossing the stream at the city limits. Records showed that one portion of this road was closed by high water for an average of 21.5 days per year, which necessitated a detour which added 1.10 miles.

The remaining portion of the "bottoms" road is at a higher elevation but was closed by high water for an average of 4.5 days per year. The detour that had to be used during this time added 18.65 miles of travel.

Ferry service was established which handled part of the traffic during these floods. During flooding periods it was estimated that the normal traffic volume of 7,900 vehicles, which included 1,580 trucks, was reduced approximately 50%. The total yearly cost to the public resulting from flooding of this portion of road was estimated to be $82,455.

Each year when flooding occurred the public became conscious of the need for a high level road which would provide a useable facility for a maximum time. Numerous schemes were suggested but it was not until 1948 that detailed studies were begun by the Ohio Department of Highways.

Flood Duration Charts covering a 50-year period were prepared as an aid to determining the controlling elevation to which a new road could economically be constructed. After due consideration it was decided that the construction of the new highway to a minimum elevation of 531.0 (river stage of 60.7 ft.) would provide a useable road for 364.4 days per year. This represented the highest elevation that could be economically justified.

Various plans were considered during the location studies, all of which proposed a maximum use of existing roads. The one finally adopted was for the construction of two lanes of pavement at elevation 531.0, parallel to the "bottoms" road, to serve for west-bound traffic under normal conditions and for two-way traffic during flood times. This plan necessitated widening part of the existing road, reconstructing part of one feeder at higher elevations, and building ramps for connetcions to other roads.

Westwardly from the point where the "bottoms" road reached an elevation above 531.0, the alignment of U. S. 52 was poor for nearly two miles. Within these limits there was also one small area that was inundated at flood times. It was determined to correct both of these conditions by constructing four lanes of pavement and a concrete median.

Berm widths throughout the proj-

★ Looking across the "bottoms" toward Portsmouth (spire in far distance). New high roadway completed; grade separation in foreground takes old road under the new. (Old roadway seen paralleling new in middle distance)

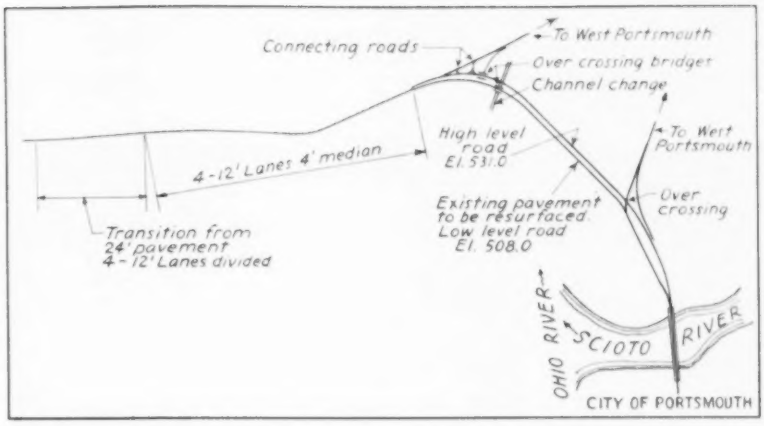
ects were to be a minimum of 10 ft., or 12 ft. where guard rail wrs required. The pavement was to be 9-in. reinforced concrete.

The over-all length of the project was 3.939 miles. Bids were received June 27, 1950, and a contract was awarded to Carl Myers & Co. and W. H. Ringwald & Sons Co., Inc., of Columbus, for $1,494,248.42.

The contractor experienced considerable difficulty in obtaining borrow material within the moisture limits imposed by the contract, which were not to exceed the optimum. High water through the 1950-51 winter and the following spring retarded progress on the roadway. The raising of the several high truss spans of the Scioto River bridge by the use of pneumatic jacks was accomplished with a minimum of traffic inconvenience [described in Roads and Streets, November, 1951].

Willow mat toe protection along the up-stream side of the roadway embankment in the "bottoms" area was another interesting phase of the work, and proved to be very beneficial.

Traffic has been using the new road since October, 1952, and all contract work was completed this summer.



★ When the low roadway is flooded out, the new parallel high roadway handles two-way traffic. Solution saved a substantial sum over a 4-lane high-level road

★ Typical cross-section through old and new roadways

Penn Turnpike earned $21 million last year

The Pennsylvania Turnpike Commission has announced a record gross revenue of $21,281,499.36 from 11,304,669 vehicles using the superhighway during the fiscal year ending May 31, 1953.

This represents a 32.2 per cent increase in gross revenue and a 28.5 per cent increase in vehicular traffic over the previous fiscal year, according to Chairman Thomas J. Evans. Net profit for the year was $7,631,700.29.

Operating expenses, including the maintenance of roadway and structures, maintenance and operation of tunnels, fare collection, Turnpike patrol, public safety and general administrative were $4,363,661.04. Interest on bonds amounted to $5,890,525.32.

Non-operating charges, which included the insurance fund costs and replacement reserve fund appropriations, were $3,383,022.

Non-operating income from the interest on insurance fund investments totaled $7,963.76.

The bumper earnings on this toll road have placed its entire bond redemption program approximately 7 years ahead of schedule. Nearly 60 per cent of last year's total revenue was derived from commercial vehicles. The 2,209,915 trucks which rumbled over the superhighway paid $12,548,141.68 in tolls, an average of better than 4 cents per mile.

Passenger cars numbered 9,032,346 and paid tolls amounting to $8,488,558.83, an average of a little less than one cent a mile.

The revenue from 62,408 buses was $244,748.85, an average of better than 3 cents per mile.

Passenger car miles on the Turnpike last year totaled over 817 million. Trucks traveled almost 287 million miles and buses rolled up over 6 million. The total distance traveled by all vehicles was well over a billion miles on the 327-mile system.

The daily traffic average (not all past any given point) was 31,000 vehicles.

● **This will surprise some drivers.** A study of 215 over-the-road tractor-trailer drivers shows the Mr. Milquetoast type of person to be the better driver. This means that a safe driver tends to be cautious, dependent, alert, somewhat tense and not cocky and domineering in his relationship with other drivers and people. Drivers who rated in the upper 50 per cent on personality, self-sufficiency, and dominance had twice as many accidents per 5,000 mi. of driving as those who rated in the lower 50 per cent.—*Driving Laboratory News (22 D 53).*

Orlando suburban development gets new streets

★ Grading is in progress here for new oil mix streets in Pine Hills, a subdivision near Orlando, Florida. Bumby & Stimpson, of Orlando, contractors

Job and Equipment Ideas

★ Emergency water supply for transit-mix batching was provided by the two barge hulls, seen alongside the gravity supply tank next to the batcher

Emergency tanks for mix water at batch plant

One of the contractors on the West Virginia Turnpike, S. J. Groves & Sons Co., set up a concrete batch plant along a rail siding near the job, with the expectation of getting water for transit mix from the creek alongside.

This water source was condemned, however, due to high organic content. The solution was to drill a 65-ft. well and install an electric well pump. But because of the imperative need for unbroken speed in producing some 10,000 cu. yd. of substructure concrete, the contractor decided to create an emergency water source for use in event of temporary power or motor failure. As pictured here, a pair of 10,000-gal. steel barge hulls was the answer. These units were imported by rail, set alongside the plant, and connected by pump with the gravity tank supplying the truck mixers. Normal water supply will continue to be delivered by well pump.

How to move curing straw

In Indiana during the 1952 season the Roads and Streets editor snapped the accompanying photograph, showing straw being handled by a fork mounted on a loader.

This example of how to handle curing straw in a hurry was seen on the concrete paving job of Rieth-Riley Construction Company, of Goshen, Indiana. A subcontractor, Mr. Les Haynes, performed the straw placement and removal, and also the sprinkling to keep it wet. The project was on U. S. 52 near Templeton, on the Chicago to Indianapolis route.

Better blasting with alternate-velocity technique

A new blasting method which uses charges of low and of high velocity explosive in alternate holes, in conjunction with millisecond delay detonators, is available to quarry, open pit and strip mine operators and construction men.

Tested in the quarry field, the new method has often resulted in more breakage per pound of explosive, together with better control of throw. Need for secondary blasting has been diminished and in some cases practically eliminated. The new system is termed "alternate velocity loading" by the Atlas Powder Company which developed it.

In practice, the rock is placed under a powerful twisting stress by the initial discharge of a low velocity explosive. High velocity explosive, detonated a small fraction of a second later, hits the fully stressed rock at the moment when maximum shattering action can be obtained. As in the past, millisecond delay detonators are used and contribute to the total performance.

Economy is maintained by the use of low-cost ammonium nitrate explosive which is made to perform as low, medium or high velocity explosive by the insertion during manufacture of a core of ammonia gelatin.

Technical information on application is available from the Technical Division, Explosives Department, Atlas Powder Co., Wilmington, Del.

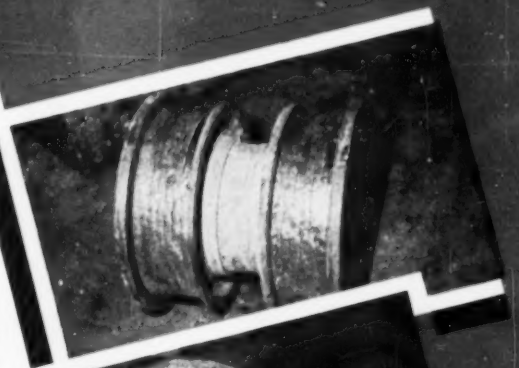
● Base courses (under any type of surface) are generally better heat conductors than natural soils. Result: depth of frost may be considerably greater under pavements than in adjacent open ground.

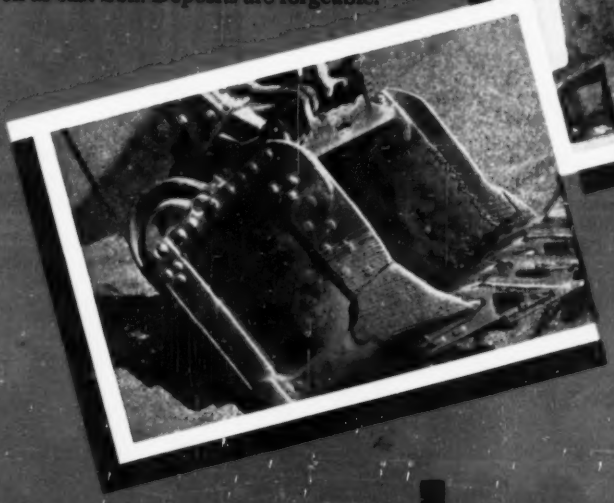
★ Removing curing straw from an Indiana concrete road job

For Low-Cost, High Impact Strength

STOODY 1027

The *manual* hard-facing rod that cuts wear on EARTH-MOVING, ROAD-BUILDING AND SIMILAR HEAVY EQUIPMENT!





If you want low-cost wear protection, STOODY 1027 is for you! Here's an all-position AC-DC electrode that lays down a smooth, uniform deposit or can be applied in multiple passes for higher build-ups. Requires no slag chipping between passes. Runs free from slag interference and bonds readily to plain carbon, alloy and manganese steels as well as cast iron. Deposits are forgeable.

TYPICAL APPLICATIONS

STOODY 1027 is ideal for manually hard-surfacing large bulky parts too heavy to position for down-hand welding. Typical uses: tractor rollers, bucket sides, drive sprockets, top carrier rolls, idlers, tumblers, track pads, clutches, clevises, sheaves, grousers, gear teeth, etc.

Ask your dealer for details (see the yellow pages of your phone book) or write direct.

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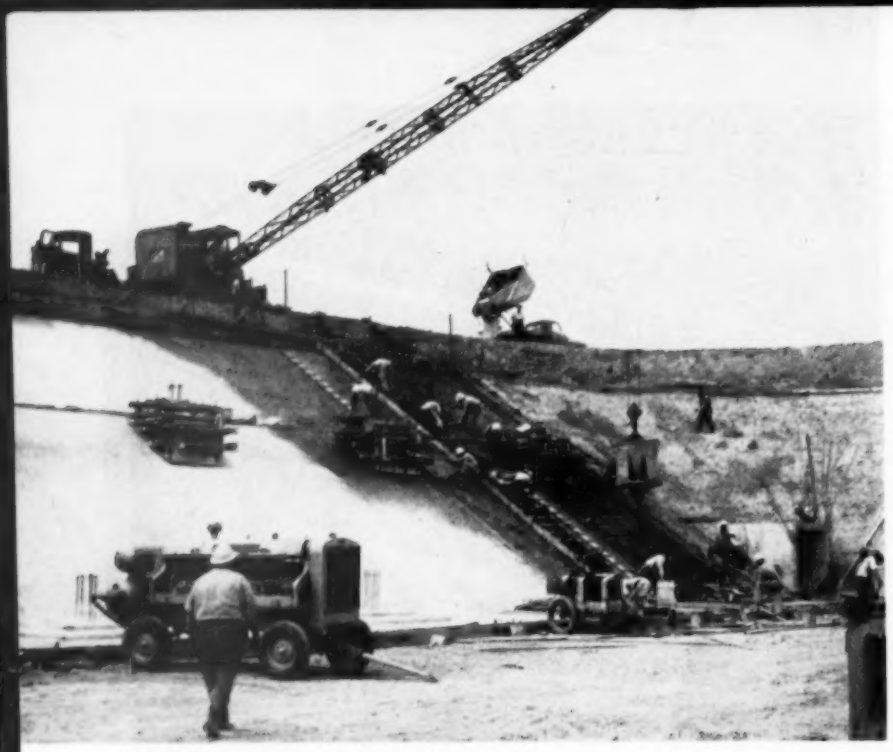

★ Setting concrete buckets for reservoir lining

Motor crane handles concrete placement for heavy slope pavement

Contractors who have slope pavement to place, in connection with grade separations, bridges and other work, will be interested in the job pictured here—part of a large water-supply reservoir at Salt Lake City. Peter Kiewit Sons Company was the contractor for the Metropolitan Water District of Salt Lake City.

The 9-in. reinforced concrete was placed from a motor crane stationed at top of the bank, using a 1-yd. drop bucket. Concrete was delivered in Dumpcrete bodies from a mixing plant located on the project. Because of the steep slope (1½ to 1) the concrete mixture was required to have a slump of 4 to 5 in. during the hot, dry weather when placed, in order to permit proper strike-off and finishing. A heavy hand screed was used followed by normal hand finishing operations. Concrete was vibrated.

The slabs were placed working from movable stairs set alongside the forms by the crane. Rubber strips were used as water seals at all joints.

Floodproof outfall structure

An ever-present design problem in sewer outfalls is to determine the type of end treatment for the sewer where it is exposed to flooding and high velocity cross currents. A common solution is to build a massive headwall with wingwalls and current deflectors set on piling.

Because of the intricate form work, reinforcing, volume of concrete and number of piles required, this type of construction is costly. These structures often fail because flood waters cut under and behind them causing the sewer proper to become detached from the headwall.

Originally a design of this type was proposed for a sewer in Middletown, Ohio. But Armco engineers suggested a design as shown in the pictures which was accepted. In detail, the last 32 ft. of 102-in. asbestos-bonded sewer was placed in 120-in. Multi-Plate Pipe and the annular space between the two pipes filled with concrete. The double pipe section is attached to two concrete saddles shaped to fit the bottom third of the outer pipe and located at about eight feet from each end of the 32 foot length.

This design resulted in a saving of several thousand dollars over the original proposal and is considered to be a more permanent structure for conditions usually encountered at sewer outfalls.

★ Details of double corrugated plate pipe used for sewer outfall

Ousted property owners to be aided by road officials

Establishment of a new public service policy designed to provide immediate financial assistance to property owners whose homes are being acquired for construction of the Garden State Parkway, was announced recently by Ransford J. Abbott, chairman of the New Jersey Highway Authority.

The Authority will make such down payments, not to exceed 25 per cent of the mutually agreed value of the property being acquired, when immediate financial assistance is deemed necessary and in the best interests of the owner. The property owner who is in immediate need of funds and desires such temporary aid must offer documentary proof of clear title to be eligible to receive the down payment.

Mr. Abbott also emphasized that this service, which is a voluntary action on the part of the New Jersey Highway Authority, was being instituted to assist owners who might otherwise find it temporarily difficult to readily purchase new properties or to relocate their present home.

Make it the Biggest Bonus ever— Give it in U.S. Savings Bonds

If your company is one of the more than 45,000 companies that have the Payroll Savings Plan you *know* what your employees think of Savings Bonds—they spell it out for you every month in their Savings Bond allotments.

If you don't have the Payroll Savings Plan, and are wondering whether your people would like to receive their bonus in Bonds, here are a few significant facts:

—every month, *before they get their pay checks or envelopes*—8,000,000 men and women enrolled in the Payroll Savings Plan invest $160,000,000 in U. S. Savings Bonds.

—the ranks of Payroll Savers are growing: On June 30th sales of $25 and $50 Savings Bonds, the sizes purchased chiefly by Payroll Savers, were 6% and 9% higher than in the corresponding period of 1952.

—Payroll Savers hold their Bonds: 75% of the $7,400,000,000 Series E Bonds which had matured up to June 30, 1953, were being retained by their owners beyond maturity under the automatic extension program.

—on June 30, 1953, the *cash value* of Series E and H Bonds—the kind sold only to individuals—totaled $36,043,000,000, a new high.

It costs no more to give your Christmas Bonus in Savings Bonds. To the Payroll Saver, and to the man who buys his Bonds at a bank (because his company does not provide the Payroll Savings Plan) a One Hundred Dollar Savings Bond looks bigger and better than a check for $75. *Make this a merrier Christmas for every employee. Give the gift that keeps on giving.*

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ROADS and STREETS

Thruway Symposium Feature of ASCE Annual Meeting

Average auto trip on New York Thruway is 34 miles, and only 17 per cent of trucks will exceed 150 miles. $120 million saving by state-backed financing told.

THE $500 million New York Thruway, history's largest road job, was the subject of a notable symposium at the annual meeting of the American Society of Civil Engineers, held in New York, October 19-23.

At a luncheon meeting, with a record crowd in attendance, Bertram D. Tallamy, chairman of the New York State Thruway Authority, outlined the organization and operating procedures under which this giant project is being brought into being. G. Donald Kennedy, chairman of the executive committee of the Society's Highway Division presided.

Keying his talk to the convention theme of mass transportation, Tallamy characterized the project as a major undertaking within the scope of that subject. The road's 427-mile Buffalo to New York "main line" is scheduled for completion late in 1954. Meanwhile, detailed construction plans are being made and financing methods studied for other authorized sections.

$19,000,000 First Year

During the afternoon session following the Tallamy luncheon, with Harold J. McKeever presiding as a member of the executive committee, Highway Division, ASCE, Elmer B. Isaak of Madigan-Hyland, consulting engineers, Long Island City, N. Y., presented a paper on the economic feasibility of the Thruway. The first full year of operation will produce an estimated $19 million in toll or license tag revenues, he said, of which 62 per cent will come from commercial vehicles, representing 19 per cent of the traffic count. Annual revenue for the system is conservatively estimated to rise to $35 million in ten years, at which time 72 per cent will be commercial.

The low percentage of revenues expected from passenger vehicles is due to the bargain price represented by the annual permit tags available to any New York resident.

Short trips between cities along the Thruway route are expected to be the predominating type of patronage, said Isaak. In contrast with the pattern for other turnpikes, the average car trip will be about 34 miles, with "long trips a negligible factor except for trucks," which will, however, average only 94 miles, with 83 per cent under 150 miles. This estimate emphasized the role of the Thruway as a "series of sections connecting the adjacent population centers, rather than a high-speed funnel channeling great streams of traffic from one end of the state to another." Much of the traffic will consist of regular users going about their local business. Trucker patronage especially will show a tendency toward repetitive trips by a relatively few users.

Speaking on the Thruway's design features, James E. McMorran, chief engineer, N. Y. State Department of Public Works, told the large audience at this symposium that the location of interchanges was one of the most difficult problems "because every community feels that it must have an interchange." Interchanges and other design elements, however, were planned with the criterion of giving the motorist and trucker a facility so superior to the present circuitous, congested routes that he will gladly pay the fee. Once on the Thruway, the inducements to the traveler to continue patronage will be the sustained, uninterrupted speed, safety, freedom from delays, economy of operation, and complete avoidance of congestion.

Conrad Lang, deputy chief engineer of the Thruway Authority, speaking on pavement, pointed out major design factors. These include the prevalence of frost and the relative abundance of economical glacial gravel for base or foundation course construction.

Overpasses More Economical

Last paper of the day was that of Edward W. Wendell, deputy chief engineer, N. Y. State Department of Public Works, who discussed the design of the Thruway's 552 bridges and grade separation structures. Wendell told of the trend toward simplified esthetic design, and the use of such details furthering this trend as light appearing yet strong and economical hand railings.

Also described are the substantial economies being achieved by carrying the Thruway over, rather than under, railroads, eliminating the cost of the heavy decks for railroad loadings and the cost of interference with normal rail operations.

The complexities of the soils problems along the Thruway were described by George McAlpin, Jr., director of the bureau of soil mechanics, N. Y. State Department of Public Works. Speaking at a meeting sponsored jointly by the Highway, Construction, Soil Mechanics and Foundations, and Structural Divisions of the Society, with Roy E. Jorgensen presiding as a member of the Highway executive committee, Mr. McAlpin traced the various special problems. These have included swamp mucking, and traversing of ancient glacial outwash plains, in a variety of subsurface conditions perhaps unparalleled in modern highway construction. His paper emphasized the role of the soils specialist, geologist and pedologist in modern highway design.

The unique floating foundations of the Thruway bridge over the Hudson, presently under construction between Nyack and Tarrytown, was described by Emil H. Praeger, of Madigan-Hy-

(Continued on page 50)

Other Points from Tallamy's Thruway Talk

- The state-backed bonds for the $500 million New York Thruway, sold at low interest rate, will save the state $120 million during the financing period, compared with higher interest financing necessary had the bonds been secured only by future tolls. Bonds sold to date yield 2.7 per cent average interest.
- To date 158 miles of 4 and 6 lane pavement has been completed, and many miles more were rapidly being prepared for paving as winter approached.
- Traffic during the first year of full operation (1955) is expected to total 55,000,000 trips, or more than twice the total trips handled during the first ten years of operation of the 160-mile Pennsylvania Turnpike.
- Over 800 miles of new public highway will have to be built as relocations or connections to the 427-mile main line—a little-publicized part of the Thruway construction job.

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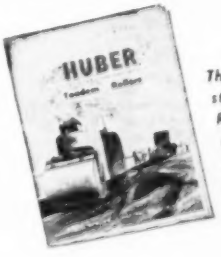
Here's a new HUBER Tandem Roller that offers new standards of performance in terms of speed, dependability, smooth operation and long life.

Make up a check list of every feature you'd like to see in a tandem roller—and see for yourself how HUBER has anticipated your needs. More than a score of major and minor refinements are incorporated in its design and construction.

Such features as permanent bearing alignment in the kingpin and swivel pin assemblies, the wrap-around frame that gives you a new concept of rigidity, and HUBER's perfected version of fluid coupling are among the improvements that will catch your interest.

The best way to get the whole story is to see one of the new HUBER tandems in action. Second best is to write for a copy of the new HUBER TANDEM ROLLER BULLETIN, No. T-152. Send for your copy today, or see your nearest HUBER Distributor.



This 16-page bulletin, T-152, tells the story of the new HUBER Tandem Rollers in pictures and descriptive copy. Ask for your copy—address requests to Huber Manufacturing Co., Marion, Ohio.

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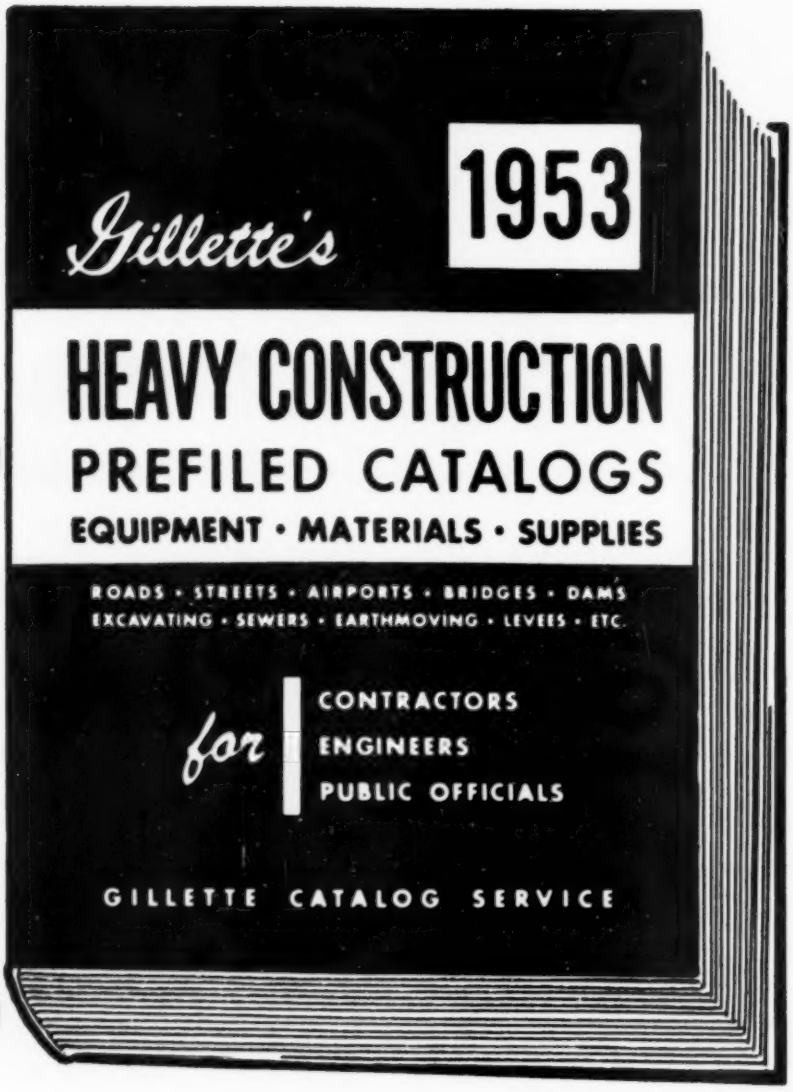

Your most useful source of Buying Information

- This book saves you cabinet and floor space and the secretarial time that would otherwise be spent in classifying and filing individual manufacturers' catalogs.
- It saves you, too, the time and trouble of writing to manufacturers for the information you need. Here are enough facts to enable you to study the product that interests you and to decide whether to call your local dealer or distributor for decisive action.
- When you want information quickly, on a certain class of product or on the product of a specific manufacturer, turn first to the index for the name or trade name of the product in which you are interested and then to the manufacturers' catalog which is arranged in alphabetical order by manufacturers' name.

When you are in the market for new construction equipment, materials or supplies, turn to Gillette's Heavy Construction Prefiled Catalogs for information on what to buy and from whom. Here's the swift, economical and satisfying way to make your pre-purchase studies. In this single volume many of America's leading manufacturers of these products have placed their catalogs, many of them specially designed for your convenience—"boiled down" to save you time and energy.

CATALOGS...

the way you asked for them—PREFILED

Contractors, engineers, public officials **PREFER** receiving manufacturers' catalogs **PREFILED** rather than to have individual catalogs sent by manufacturers. Individual catalogs are usually mislaid or thrown away.

The manufacturers listed below have followed your wishes—and at considerable expense. Through the **PREFILED** method they have supplied you with catalog information on their products in the current 1953 edition of Gillette's Heavy Construction Catalog File (See opposite page). Be sure to take advantage of this information. Use the Gillette Catalog File all the time. Keep it handy every day—every week. Use it often. Consult the Catalog File when you want information before buying new equipment, materials or supplies.

Here is the list of manufacturers who have supplied you with buying information on their products.

Adams Manufacturing Co., J. D.
Allis-Chalmers Manufacturing Co.
All Purpose Spreader Company
American Air Filter Co.
American Bosch Corporation
American-Coleman Company
American Manganese Steel Division
American Marietta Co.
American Steel & Wire
American Tractor Equipment Corp.
Anthony Company
Armco Drainage & Metal Products, Inc.
Arrow Manufacturing Company
Austin-Western Company

Baldwin-Lima-Hamilton Corp.
Badger Machine Co.
C. L. Ballard
Beardsley and Piper
Bicknell Manufacturing Company
Briscoe & Son, E. V.
Bros Boiler & Mfg. Co., Wm.
Buda Company, The
Buffalo-Springfield Roller Co., The
Butler Bin Company

Carey Manufacturing Co., The Philip
Carson Company, H. Y.
Carter Co., Ralph B.
C. H. & E. Manufacturing Co., Inc.
Chausse Manufacturing Co., Inc.
Cleaver-Brooks Company
Cleveland Formgrader Co., The
Cleveland Frog and Crossing Co.
Cleveland Trencher Company, The
Clipper Manufacturing Co.
Clyde Iron Works
Concrete Surfacing Machine Co.
Crockett Brothers
Cummer & Son Company, The F. D.
Cummins Engine Company, Inc.

Davenport Besler Corporation
Detroit Diesel Engine Division
Dixie Tally-Ho, Inc.
Dorsey Trailers

Eagle Crusher Co., Inc.
Electric Tamper & Equipment Co.
Erie Steel Construction Company

Falker Manufacturing Co.
Ficke Brothers Refining Co.
Flexible Road Joint Machine Co., The
Flintkote Company, The
Foundation Equipment Corporation
Frace Manufacturing Co.

Gallion Allsteel Body Company
Gallion Iron Works & Mfg. Company
Gar Wood Industries, Inc.
General Excavator Co.
General Motors Corporation
Gledhill Road Machinery Co., The
Goodall Rubber Company
Gradall Division, Warner & Swasey
Haiss Mfg. Co., Inc., Geo.
H. & L. Tooth Co.
Hammermills, Inc.
Harnischfeger Corporation
Hauck Manufacturing Co.
Heltzel Steel Form & Iron Co.
Hercules Motors Corporation
Herman Nelson
Highway Equipment Co., Inc.
Hose Accessories Company
Hough Co., The Frank G.
Huber Manufacturing Co., The

Jackson Vibrators, Inc.
Johnston and Jennings Co.
Joint Equipment Company, Inc.
Joy Manufacturing Company

Keystone Asphalt Products Company
Kiesler Co., Jos. E.

La Crosse Trailer Corporation
Lasco-Neville Co., The
Le Roi Company
Lincoln Electric Company, The
Littleford Bros., Inc.
Lubriplate Division

Marlow Pumps
Master Vibrator Company
Michigan Power Shovel Company
Minneapolis-Moline

Naugatuck Chemical Division
Noble Company

Oliver Corporation, The
Omaha Standard
Onan, D. W. & Sons, Inc.
Osgood-General
Ottawa Steel Products, Inc.
Owen Bucket Co., The

Pacific Car and Foundry Company
Page Engineering Company
Philadelphia Textile Finishers, Inc.
Phoenix Products Co.
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Republic Steel Corporation
Riddell Corp., W. A.
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Salem Tool Company, The
Sauerman Bros., Inc.
Schramm, Inc.
Service Supply Corporation
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Williams Form Engineering Corp.
Winter-Weiss Co., The
Wyoming Valley Equipment Co., Inc.

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Thruway Symposium

(Continued from page 46)

land, consulting engineers. This bridge was also the objective of a convention field trip.

Daniel V. Terrill, dean of engineering, University of Kentucky, was installed as president of ASCE at the annual meeting. New board members include Enoch R. Needles, consulting engineer of New York and Mason G. Lockwood, consulting engineer, Houston, vice-presidents; and directors as follows: William S. LaLonde, Jr., College of Engineering, Newark, N. J.; Oliver W. Hartwell, Water Resources Division, U. S. Geological Survey, Trenton, N. J.; Thomas G. Shedd, University of Illinois; Samual B. Morris, Los Angeles department of water and power; Ernest W. Carlton, Missouri School of Mines; Raymond F. Dawson, University of Texas.

O. H. Ammon, A. E. Morgan, J. C. Page, and C. M. Spoffard were made honorary members of the Society.

Meetings Ahead

AMERICAN ROAD BUILDERS ASSOCIATION —Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.; January 11-13, 1954.

CONSTRUCTION INDUSTRY MFRS. ASSOCIATION — Annual Board Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.; January 11, 1954.

HIGHWAY RESEARCH BOARD — Annual Meeting, Washington, D. C.; January 12-15, 1954.

ASSOCIATED EQUIPMENT DISTRIBUTORS —Annual Meeting, Waldorf-Astoria Hotel, New York City; January 31-February 2, 1954.

ASSOCIATION OF ASPHALT PAVING TECHNOLOGISTS—Annual Meeting, Kentucky Hotel, Louisville, Ky.; February 1-3, 1954.

AMERICAN SOCIETY OF CIVIL ENGINEERS —Spring Meeting, Hotel Biltmore, Atlanta, Georgia, February 15-19, 1954.

WHITE HOUSE CONFERENCE ON TRAFFIC SAFETY—Departmental Auditorium, Washington, D. C.; February 17-19, 1954.

AMERICAN CONCRETE INSTITUTE—Annual Meeting, Denver, Colorado; February 22-25, 1954.

ASSOCIATED GENERAL CONTRACTORS OF AMERICA, INC. — Annual Meeting, Statler and Biltmore Hotels, Los Angeles, Calif.; February 26-March 3, 1954.

ASSOCIATION OF HIGHWAY OFFICIALS OF NORTH ATLANTIC STATES—30th Annual Meeting, Shoreham Hotel, Washington, D. C.; March 10-12, 1954.

PUBLIC WORKS OFFICIALS HEAR:

How Cities Must Cooperate With Other Agencies

HIGHWAY and street transportation is no longer something that a city government can solve alone. The need for a high degree of intergovernmental cooperation in highway affairs, and what city officials can and should do about it, were discussed at the American Public Works Association annual congress, held at New Orleans, October 26-29, 1953.

Presented as part of a broad and varied program, a paper was given on this subject by Norman Hebden, Washington, D. C. Mr. Hebden, formerly with the Highway Research Board on a cooperative research on inter-governmental relationships, noted that the problems encountered in planning and building urban highway facilities cut across different political jurisdictions, but that the local success in uniting these jurisdictions in a common program varies greatly.

Mr. Hebden reviewed an action program growing out of the committee project. As noted in Special Report No. 9, Highway Research Board (July, 1953), action is considered to be needed on the subjects of highway classification, uniform standards, planning and programming, organization and management, and authority and responsibility.

This program was the subject of a resolution by the convention at New Orleans, which embodies the following recommendations for discussion and possible endorsement by the membership:

Highway Classification

1. Legislation should authorize and direct the state highway agency to initiate and supervise the classification of all highways and streets into appropriate systems, based upon the character and extent of traffic service rendered. The same legislation should require full cooperation and clearly define the part of all governmental units in the task.

2. The state highway agency should be authorized and directed to coordinate the work of classification and to approve the systems selected.

3. Provisions should be made to permit additions to and deletions from the established systems as future needs require. Such changes should be permitted only on the basis of factual study and within established regulation to avoid uncontrolled additions to system mileages.

Uniform Standards

1. Legislation should require agreement by all appropriate highway agencies on standards for the several classes of highways and streets in relation to traffic requirements.

2. Legislation should require the adoption of uniform standards for traffic control devices and regulations and compliance with these standards by all governmental units.

3. All standards should conform as nearly as possible to recognized national standards.

Planning and Programming

1. Legislation should authorize and direct the state and each local governmental unit to prepare, under defined auspices, a statement of highway needs and financial requirements that may be expected to accrue over a specified period of years, which needs and financial requirements should be reappraised at timely intervals. The same legislation should require the consolidation of the reports and submittal of this information to the legislature.

2. The state and each local unit should be required by statute to prepare short-term improvement programs based on their respective studies of needs and funds provided. The legislation should also direct the state highway agency to assist local units in compiling their short-term programs, and should require: (a) each unit to review its program periodically to permit adjustments, and (b) state and local units to keep each other informed as to work completed and future work programmed.

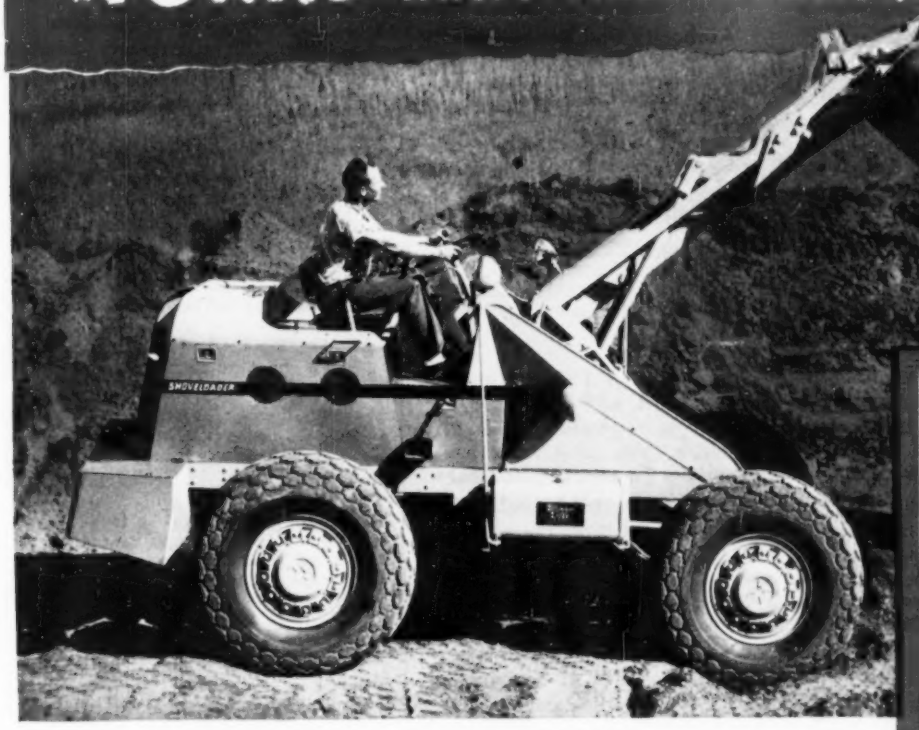
3. Legislation should provide for the full cooperation of the state and local governmental units in metropolitan regions in integrating highway route plans in such regions.

Organization and Management

1. Highway legislation, organization and management practices, and budgetary and accounting systems of all units of government should be reviewed. Where necessary, revision should be made to provide the most effective administrative machinery for the conduct of cooperative highway undertakings, including: (a) the training of personnel, (b) provision for joint administration of roads by local units, (c) adoption of the county unit administrative plan, (d) appropriate methods of administrative supervision, and (e) provision for the

NEW 4-WHEEL DRIVE Shoveloader

WORKS where other Loaders FAIL!



● This powerful new Shoveloader is designed and built for *HEAVY* work under the toughest conditions. Outstanding features—many of them exclusive—permit top capacity performance in extremely rough terrain, where other units falter and fail . . . Power from the heavy-duty gas or diesel engine is applied through positive 4-wheel drive, 5-speed transmission, forward and reverse . . . Positive 25" downcrowd, bucket width completely covering wheel tread, and operator control of tilt in any position, provide maximum digging and stripping effectiveness. Operator's position insures maximum visibility and safety.

Equipped with 1½ cu. yd. bucket as standard. Also available: 1¼ yard heavy duty and 2½ yard light material buckets, pallet forks, backfill blades and crane hook attachments.

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1. Rear axle oscillates 23° about longitudinal axis for maximum ground pressure on all four wheels at all times. Hi-flotation type tires permit operation in soft or rough ground.

2. Positive 4-wheel, 5-speed transmission, and 100-inch wheelbase enable unit to negotiate steep earth banks, ramps or obstructions. Hydraulic power steer. Front or rear wheel steer optional. 4-wheel steer available.

3. 3 to 1 Planetary gear reduction in each of four wheels reduces torque 300% in axle shafts, gear case and drive shaft to prevent axle and drive line failure. 4 Planetary gears distribute load evenly to wheel-ring gears.

4. Unobstructed visibility enabling operator to see bucket in lowered position, increases safety and performance. Hydraulic arm-type loader has parallelogram action, with position lift and tilt controls.

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employment of professional engineering services by all highway agencies.

2. State responsibility for state-local cooperative undertakings should be assigned to a single staff unit, reporting directly to the chief executive of the state highway agency. The unit should be competently staffed to provide for the separate handling of local rural and urban work.

3. Each local governmental unit should designate and empower a single highway official to coordinate all its activities affecting highways and, within fixed policies, to negotiate with state highway officials.

4. Legislation should authorize all highway agencies to enter into joint agreements for the performance of highway work, including the use of equipment, purchase of materials, employment of professional and other services, and mutual aid.

5. All means of communication—within a state highway agency, between it and the local units, and among local units—should be fully utilized. Policy statements, manuals of practice, information bulletins, and frequent inter-level conferences of highway officials should be employed to assure adequate dissemination of information and enhance mutual understanding.

Authority and Responsibility

1. The highway laws of the federal government and those in each state should be reviewed and, where necessary, revised to define clearly and assign definitely authority and responsibility for the highway function at each level of government.

2. Policy-making and executive functions should be separated to the greatest extent possible by the various governmental units either through legislation or administrative action.

3. Whenever the various units of government are acting jointly, the administrative and financial responsibility of each should be clearly specified, either by legislation or administrative action. Whenever feasible, a policy with respect to financial participation should be established.

THIS I RESOLVE

(A Resolution for the New Year)

FRIENDLINESS: TO cultivate a cheerful disposition, a friendly smile and a cordial hand shake. To get acquainted with one or more new people each day and try earnestly to remember names of those I meet. TO take time to talk with those younger or less fortunate than myself and make their lives happier if possible.

SERVICE: TO give charity to those in need and words of encouragement to those in trouble. TO serve my fellowmen to the best of my ability, helping others up the ladder of success whenever possible and never withholding good when it is within my power to give it. TO contribute a part of my time, talent and wealth promoting the brotherhood of man.

ENTHUSIASM: TO not indulge in self-pity but work enthusiastically on the job at hand. TO cultivate an earnestness regarding ideas, philosophies and projects I believe in that will inspire and enthuse others.

SINCERITY: TO be sincere, loyal and honest in all my dealings with others. TO never be deceitful to my fellow-employees, disloyal to my employer or dishonest to myself. TO strive at all times to deserve respect.

CONFIDENCE: TO not fret over trifles or about things displeasing over which I have no control. TO seek facts by asking pertinent questions that I may be selfconfident in all the things I say or do. TO refuse to be discouraged.

DILIGENCE: TO do my very best at all times. TO use a part of each day to read, study, meditate and to seek the guidance of The Power greater than I that I might end each day with some useful work well done. TO constantly search for knowledge and wisdom.

MORALITY: TO not say or do anything that will bring disgrace or ill-fame to myself or any other person.

TEMPERANCE: TO not be excessive in habits of eating, drinking, sleeping, talking, playing or working. TO not allow my mind to become doltish or my body to become sluggish due to intemperance in anything.

ORDERLINESS: TO strive to bring order out of disorder wherever I find it. TO obey the commandments of God, the laws of man and the rules of good conduct.

SILENCE: TO avoid rumors and never repeat a rumor knowingly. TO have an attentive ear for facts. TO be a good listener.

By B. R. Cruce, City Manager, City of Pampa, Texas

Offner, New President

Milton Offner, secretary, Board of Public Works, Los Angeles, California, was named president of the American Public Works Association at its 59th annual meeting, held in New Orleans, Oct. 26-29.

Mr. Offner succeeds Allan H. Rogers, superintendent of public works, Garden City, N. Y., who remains on the Association's Board of Directors as immediate past-president. Mr. Offner has been active in the organization for the past ten years and was instrumental in the formation of the Southern California Chapter of the Association.

Other newly elected officers include: Kenneth K. King, director of public works, Phoenix, Arizona, Western Area Vice-President for a two year term; Edward P. Decher, secretary and purchasing agent, Joint Sewer Commission, Newark, New Jersey, Eastern Area Vice-President (re-elected for another two-year term); Frederick W. Crane, commissioner of public works, Buffalo, New York, and Albert G. Wyler, city engineer, New Orleans, La., were each elected to serve two-year terms as directors-at-large. Charles W. Darling, director of public service, Grand Rapids, Michigan, was elected treasurer to succeed Mr. Wyler, the former incumbent.

Warren A. Coolidge, director of public works, Nashville, Tenn., and Ralph C. Graham, superintendent of construction and public works, Davenport, Iowa, continue to serve the second of their two year terms as Vice Presidents of the Southern and Central areas, respectively. Other members of the Board of Directors who were elected to serve two year terms last year are: George G. Hyland, commissioner of public works, Boston, Mass., and Jean L. Vincenz, director of public works, San Diego County, San Diego, Calif.

Charles A. Emerson, a partner in the consulting engineering firm of Havens and Emerson, New York City, was elected to Honorary Membership in the Association.

Francis J. Magnuson, city engineer of North Mankato, Minnesota, was named the recipient of the 1953 Charles Walter Nichols Award. This $500.00 award was presented in recognition of his outstanding leadership in the restoration and rehabilitation of municipal services in his city following the disastrous flood of April, 1951.

City-to-Airport Highway Deficiencies

Measured by Modified Sufficiency Rating System

Deficiency in traffic flow capacity was measured for each section of the route between downtown Richmond and the Richard E. Byrd Airport at Richmond, Virginia, using a modern facility for comparison. The method is applicable to any city's airport access road problem

By Walter R. Macatee
Former Highway Transportation Specialist
Civil Aeronautics Administration

RICHMOND-NEW YORK airline flights are scheduled at a speed of 3 miles per minute. But the ground travel at Richmond, Virginia, from downtown to airport, is at a speed of only four city blocks or 1800 feet per minute. Whereas the air trip requires only 1 hour and 47 minutes in the air to go 310 miles, the downtown-to-field trip requires over 24 minutes to go 8.4 miles on congested late afternoons.

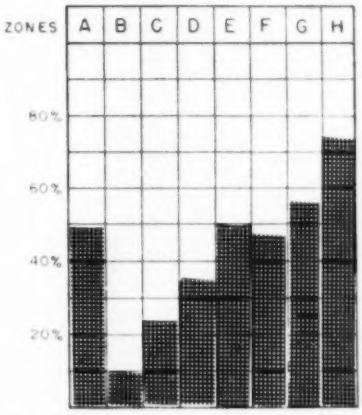
The daytime ground pace can be cut in half at 2 A.M. when traffic is thin, without violating speed laws, indicating the time penalty being paid by airline patrons due to congested, inadequate access streets and roads.

Measuring Deficiencies

Officials of the Richard E. Byrd Airport at Richmond, in common with other city airport officials, have long realized the inadequacies of the routes between the field and its principal source of business. However, exact locations and extent of each section's shortcomings were not known. A yardstick was therefore needed. Especially needed were terms by which results from such measurements could be expressed in non-technical language. Specialists in cooperation with Richmond's Bureau of Traffic Engineering recently used a modified form of the well-known Sufficiency Rating System for measuring the efficiency of access roads to Byrd airport, designating the system as a City-Airport Time Rating.

The Sufficiency Rating System, forerunner of City-Airport Time Ratings, is an engineering method used for evaluating rural highways. It takes into account numerous forms of highway deficiencies. These are grouped into three major elements: (a) Structural Condition, (b) Safety, and (c) Service. This latter element is the highway's capacity to permit traffic flow to move without interruptions at high rates of speed.

When making city-to-airport time ratings, engineers consider only the Service element to measure the capacity of access streets and highways involved. This is because travel time has greater than usual significance due to the importance of speed to support aviation's primary advantage of moving people and goods with great dispatch.



★ Figure 1

The Safety component would later be taken into full account by highway engineers when designing the new facility.

Richmond's Time Rating

The City-Airport Time Rating for Richmond is a relative measure of time required to reach, by passenger-type automobiles, the city's principal airport from its central business section during peak hours of traffic. Peak traffic periods are usually from 4:15 to 6:30 P.M. on business days, Mondays through Fridays. Such ratings are expressed as a percentage of time required to negotiate travel during these hours, between such points, under existing conditions as compared with estimated traveltime required when access streets and highways are brought to adequate standards. Such standards are to be incorporated in a high-speed, limited access expressway on U. S. Route 60, programmed for construction in the foreseeable future by the Virginia Department of Highways to replace a substantial portion of the existing access street and highway from mid-city to the airport.

Current time requirements at Richmond were measured by traffic engineers who conducted accurate test runs, using stop watch methods, during peak-traffic hours over the route constituting the principal ground access between the city's central business area and its airport. By limiting study to the most acceptable route, necessity of considering second, third or fourth-choice routes was eliminated.

Route Studied by Zones

Speed of Richmond's automotive traffic over the existing airport-city access route varies greatly during peak traffic hours. Traffic movement ranges from 2½ mph. on densely traveled portions to relatively high speed (31 mph.) on an outlying section. Therefore, development of Richmond's City-Airport Time-Rating required dividing the route under study into eight zones. This breakdown was based on varying speeds of traffic which obtain in each zone during peak hours. The zones are listed in Figure 1 which also shows appropriate data pertaining to each zone from which average current peak-hour travel time required was computed (24.17 min.).

Even though route sections will be brought to design standards which will permit higher speed, local traffic regulations may limit traffic to rates below the designed speeds. However, for the purpose of determining the route's time rating, estimated speeds possible in five of the eight zones after improvement were tabulated (55 mph. limit in Virginia).

The current adequacy of all zones composing Richmond's airport access road facilities is illustrated in Figure 1. It shows that the 24.17 minute existing traveltime was divided into the estimated traveltime of 10.33 minutes which will be possible at all periods when the access streets are brought to the required standards. As also shown in Figure 1, the city's City-Airport Time Rating is 43%. Expressed differently, existing access highways to Richard E. Byrd Airport are 57 per cent deficient.

As revealed in Figure 2, the "H" segment (Krouse Road) in the Time Rating is at present the most efficient part of the 8.4-mile route, with efficiency of 74 per cent. Its rating could safely be increased, according to some authorities, merely by allowing traffic to move on some portions at rates somewhat in excess of the 30-mile rate now permitted. Zone "B," composed of 5th Street, Franklin to Broad, is the least efficient (10 per cent) of any of the 8 segments; traffic is dense and must contend with two traffic lights in two blocks. The three sections located on Broad Street range in efficiency from 24½ per cent to 50 per cent. The latter rate for Zone "E."

Traffic specialists, engineers and airport officials realize that numerous features affect the speed of automotive traffic. These factors include sight distance, surface smoothness, stop-and-go lights and traffic regulations. For the purpose of simplifying the Time Rating, and reducing it to easily understandable terms, the engineers felt that they should omit all technical terminology. The result was to express the rating as the ratio of traveltime now required during dense traffic hours from the principal airport pick-up sources, to the traveltime for a modern facility at allowable speeds.

Crystallize Public Opinion

Time ratings can be used to focus favorable public attention on the need for improving at least the most deficient portions of city-airport access route than do complicated analytical calculations often employed.

Citizens in all areas of American cities clamor for improved streets, and residents of each section of our cities vie with voters of other sections to have their public works projects assigned a high priority for accomplishment. As a consequence, the development of many city-airport access streets has been relegated to lower priority than their importance to transportation warrants. Alert airport officials, and others concerned with aviation, recognize, and endeavor to make clear to the public, that the highway transport phase of air transportation is an intimate, integral part of the nation's air network. Therefore, they point out that prompt development of access streets and highways to airports, adequate to enable aviation to serve efficiently, is a basic necessity of our times. They feel that City-to-Airport Time Ratings can help to secure high priorities for the development of such access facilities.

Numerous criteria must be considered which might warrant expending public funds for improving highways and streets which lead to any of the country's airports. One criterion would obviously have to do with the volume of all traffic using those streets and highways, and relating that volume to the capacity of such facilities to serve adequately both the patrons of airports and highway users. Like many somewhat similar situations, surface traffic generated by Richmond's airport might not be enough, by itself, to justify necessary expenditures for these improvements. But, as airport operators point out, the advantages resulting from development of the airport's access road facilities would benefit a far larger segment of highway users than patrons of the airport. Thus, both groups benefit.

RICHMOND'S CITY-AIRPORT TIME RATING

ZONE	LENGTH, MILES	NAMES AND LIMITS OF STREETS AND ROADS CONSTITUTING ZONES OF ROUTE FROM CENTRAL BUSINESS SECTION OF THE CITY TO AIRPORT	TRAVELTIME DURING PEAK TRAFFIC HOURS UNDER EXISTING CONDITION OF ACCESS STREETS AND HIGHWAYS			TRAVELTIME DURING PEAK TRAFFIC HOURS IF ACCESS STREETS AND HIGHWAYS ARE BROUGHT TO ADEQUATE STANDARDS OF DESIGN AND CAPACITY		
			MINUTES	SECONDS	MILES PER HOUR	MINUTES	SECONDS	MILES PER HOUR
A	0.5	FRANKLIN STREET FROM JEFFERSON ST. TO FIFTH ST.	2	28	12¾	1	12	25
B	0.1	FIFTH STREET FROM FRANKLIN ST. TO BROAD ST.	2	45	2½	0	15	25
C	0.8	BROAD STREET FROM FIFTH ST. TO 17TH ST.	3	36	13½	0	53	55
D	0.9	BROAD STREET FROM 17TH ST. TO 52ND ST.	2	54	18½	1	0	55
E	0.7	BROAD STREET FROM 52ND ST. TO GOVERNMENT ROAD	1	33	27¼	0	46	55
F	1.0	GOVERNMENT ROAD FROM BROAD ST. TO WILLIAMSBURG ROAD	2	15	26½	1	6	55
G	3.4	WILLIAMSBURG ROAD FROM GOVERNMENT ROAD TO KROUSE ROAD	6	56	31	3	24	55
H	1.0	KROUSE ROAD FROM WILLIAMSBURG ROAD TO TERMINAL BUILDING	2	2	29½	1	43	40
TOTAL	8.4		24	9	21 AVERAGE	10	19	49 AVERAGE

10.30 Min. ÷ 24.15 Min. = 43% Time Rating
Street and Highway Condition = 57% Deficient

★ Figure II. Efficiency ratings by zones for Richmond's city-airport route

Alternate Night Parking Works in Evanston

By Lt. Frank M. Andrews

Evanston Police Department
Commanding Traffic
City of Evanston, Illinois

In 1952 the city of Evanston won first place in group 7 of the national safety contest. In addition to that, Evanston was also awarded the grand prize for cities of all sizes because of its safety record—625 days without a traffic fatality, from July 12, 1951, through March 28, 1953. A traffic safety program which has been followed in Evanston for the past 25 years again paid off.

This program, which covers many subjects and is too lengthy to be discussed in this article, is quite generally known to residents of Cook county. However, a new phase was introduced in 1952 which in our opinion is good and has done the city of Evanston a great service in making it possible to clean streets at night and also to provide wider streets on which to drive. For want of a better name it has been called "alternate night parking." On one night vehicles are required to park on one side of the street and on the following night on the other side, leaving one side of every street open for travel and street cleaning every night in the week.

The following steps of our night parking program are all covered by city ordinance: In parking meter areas, no parking is permitted at all from 2 a.m. to 6 a.m. In residential areas, the side on which you park is detrmined by the date—on even numbered days you park on the even numbered side of the streets, on odd numbered days you park on the odd numbered side, and while the violation is from 2 a.m. to 6 a.m., the date that governs the side of the street on which you park is the date *before* midnight of that particular night. If one side of the street has no parking for a full block, you do not alternate in that block, but park on the one side of the street where parking is permitted. If a street is banned for parking a portion of the block, you *do* alternate, but you stay out of the no parking zone.

It is amazing how this plan has worked out and how the public has accepted it. Evanston has about 25,000 cars registered, with probably 10,000 of them parking on the streets every night. The ordinance went into effect

October 15, 1952, and a week before that date letters were sent to the owners of automobiles from the Evanston vehicle tag registration lists, explaining the parking regulations. On the nights of October 13 and 14 special warning tickets were placed on the cars that were improperly parked. On the night of the 13th, 1,500 of these tickets were issued. On the night of the 14th, 1,000 were issued. So, anticipating a large amount of "business" on the night of the 15th, additional squads were placed on the street. To everyone's surprise, only 52 cars were found improperly placed on the first night of enforcement.

Because of the good cooperation of the vehicle owners, it has been possible to do a much better and more rapid job of cleaning our streets. While it is still too early to evaluate the difference in the accident picture from 2 a.m. to 6 a.m., our accident totals for the first five months of 1953 are down about 7 per cent compared with the first five months of 1952. A more comprehensive study will be made at the close of this year.

Evanston's location in Cook county makes its traffic exposure similar in proportion to all other cities and villages in the county. Our good traffic safety record is attributal, therefore, to a reputation for strict enforcement and to good educational and engineering programs, which are carried on all the time.

Passing bays urged for slow cars on hills

Widespread construction of passing bays on long hills and narrow roads, so that slow moving vehicles can turn aside to allow pent up traffic to proceed, has been urged as a method of reducing congestion and accidents.

This idea was recommended by Dr. Herbert J. Stack, director, center for safety education, New York University. This constitutes a variant of the design policy of adding a third lane for long uphill grades, now being carried out by numerous state highway departments.

"The "bay" is described as being about 50 feet long and 15 feet wide. Such a turnout area is suggested as being feasible where the entire uphill lane cannot be added immediately because of economic reasons.

Such bays have been built in Maryland and Pennsylvania and observance of them in service has shown them to be helpful in dispersing congestion created by heavy travel. A very serious source of traffic accidents today is that caused by an impatient motorist venturing around from behind a slow truck.

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Right and Wrong Way to DEPOSIT CONCRETE

From the "Manual for Placing and Handling Concrete Efficiently," published by Gar-Bro Manufacturing Co.

CONCRETE should be placed as nearly as practicable in its final position. It should not be placed in large quantities at a given point and allowed to run or to be worked over a long distance in the form. This practice results in segregation, because the mortar tends to flow out ahead of the coarser material. It also results in sloping work planes between successive layers of concrete. In general, the concrete should be placed in horizontal layers of uniform thickness, each layer thoroughly consolidated before the next is placed.

Depositing the Concrete

In **High Walls,** the concrete should be placed to a point about a foot below the top, and an hour or so allowed for settling. Concreting should then be resumed before set occurs to avoid a cold joint. A stiffer consistency can be used in the upper section because the concrete is accessible for puddling. The form should be overfilled and the excess concrete then cut off by screeding after it has partially stiffened. To prevent segregation the concrete should not be allowed to drop freely more than 5 to 6 ft.

In **Narrow Walls** with closely spaced reinforcing steel, collection hoppers with rectangular discharge openings should be used, to which are attached various single lengths of rubber elephant trunk type drop chutes.

In **Wider Walls,** collection hoppers with round discharge opening can be used with flexible type steel drop chutes. These steel drop chute sections can be removed by unhooking as the pour progresses.

In **Open Areas** where space permits, good results can be obtained by direct vertical dumping from concrete buckets with the proper attachments.

In **Slab Construction,** placing of the concrete should be started at the far end of the work so each batch will be dumped against previously placed concrete, not away from it. The concrete should not be dumped in separate piles and the piles then leveled and worked together.

Hoppers and Drop Chutes

To properly place concrete without segregation, collection hoppers in combination with rubber elephant trunk or sectioned flexible steel drop chutes should be used. Collection hoppers are available in three basic designs:

1. Hoppers with one side open for use with wheelbarrows, push carts or power carts.

2. Hoppers with four sides for charging with normal slump concrete by concrete bucket.

3. Hoppers with extra steep slopes and rectangular top and large oval discharge opening in combination with an ovel to round transition drop chute section to handle extremely low slump concrete.

Drop Chutes for use with above hoppers are of two types:

1. Rubber elephant trunk which is flexible for use in narrow walls with rectangular connection collars or round collars.

2. Flexible steel drop chutes for wide walls or open areas. Flexible

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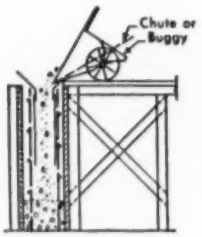
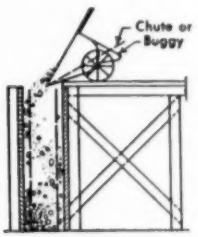
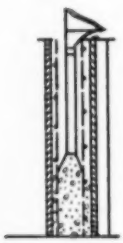
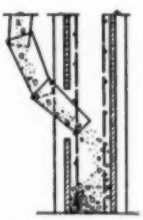
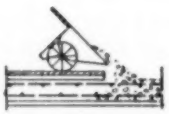
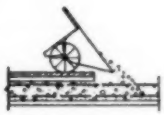
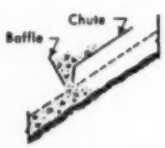
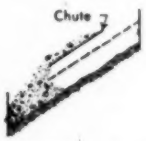
	
Separation is avoided by discharging concrete into hopper feeding into drop chute. This keeps forms and steel clean until concrete covers them.	Permitting concrete from chute or buggy to strike against form and ricochet on bars and form faces causes separation and honeycomb at the bottom.
	
Drop concrete vertically into rubber elephant trunk to control flow and prevent segregation.	Permitting rapidly flowing concrete to enter forms on an angle invariably results in separation.
	
Concrete should be dumped into face of previously placed concrete.	Dumping concrete away from previously placed concrete causes separation.
	
A baffle and drop at end of chute will avoid separation and concrete remains on slope.	Discharging concrete from free end of chute onto a slope causes separation of rock which goes to bottom of slope. Velocity tends to carry concrete down the slope.

★ Chart courtesy Gar-Bro Manual and U. S. Bureau of Reclamation

steel drop chutes are usually round and in lengths from 2 to 3 ft. with hooks and chains for connecting together.

Diameters of the proper rubber elephant trunk or steel drop chute depend on the character of the concrete being placed.

Straight-line Chutes. Steel straight line concrete chutes should be round bottomed and of ample size to guard against overflow. A slope not flatter than 1 to 3 and not steeper than 1 to 2 is recommended. Long chute lines are not recommended on important work. All chutes should be equipped with a receiving hopper at the upper or charging end, and a discharge deflector at the discharge end, so that the concrete is vertically dropped to aid the prevention of segregation.

Concrete Bucket Attachments. When placing concrete direct to forms or hoppers, either a rubber collection hopper attached to the bucket or a suspended steel sub-hopper with elephant trunk, should be used to confine the vertical flow of concrete from the large bucket gate opening to the forms, thereby eliminating waste and preventing segregation.

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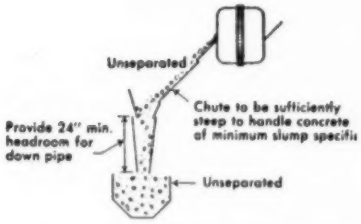
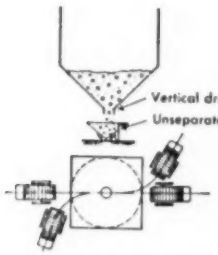
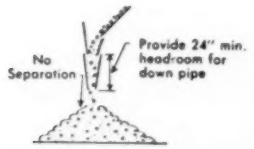

Unseparated
Chute to be sufficiently steep to handle concrete of minimum slump specifi
Provide 24" min. headroom for down pipe
Unseparated

Above arrangement prevents separatior regardless of length of chute.

Concrete should be dropped vertically directly over gate opening.



Center discharge from hopper wit vertical drop into center of buggy Approach from opposite sides permit rapid loading.



Above arrangement prevents separatio no matter how short the chute whethe conveyors being discharged into hoppers, cars, trucks or forms.

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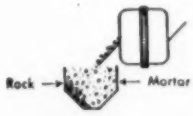
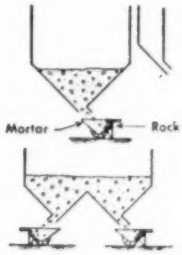
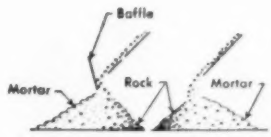


Filling of buckets, cars or hoppers directly from the mixer discharge may cause separation.

Dropping concrete on sloping sides of hopper should be avoided.



Sloping hopper gates which are in effect chutes without end control cause objectionable separation in filling the buggies.



Improper or lack of control at end of any concrete chute, no matter how short, results in separation. Usually a baffle merely changes direction of separation.

★ Chart courtesy Gar-Bro Manual and U. S. Bureau of Reclamation

Letters From Readers

To the Editor:

I have read with interest your editorial in your September 1953 issue regarding good inspection. Maybe your criticism is justified, but I gather from your remarks that the job was a small one and I am wondering if it was either done by a new inexperienced contractor, or by some public agency. And do you not find that jobs such as you described are rather the exception than the rule.

As you know, we have a tremendous highway building program in California at the present time and those of us who have participated in any of these projects are proud of them and I am sure that the State Highway Department are too. I don't know of any contractors being loaded with work in this area, because we have so many well equipped experienced contractors in this area that there is hardly enough work to go around and competition is keen. As a matter of fact, prices are cheaper than they were a year ago.

I think your remarks in the third paragraph are rather sarcastic and a little ambiguous. I think all specifications leave the responsibility of good workmanship to the contractor. We do preach, however, that result specifications are more desirable as it leaves the way open for a contractor to use his own ingenuity in doing a job and leaves the way open for other methods than might be called for in the specifications to do that job.

I am merely writing you this letter so that you will not condemn the whole construction industry because you happened to drive by and see one job that did not look too good. We are not all perfect, but I think you agree that our industry has made great strides in the last decade in building up public good will by giving them good value for their money.

J. A. Thompson
J. A. Thompson & Sons
Los Angeles, Calif.

Trucking group urged to cooperate with engineers

Cooperation between truckers and highway authorities to achieve adequate roads was urged at the American Trucking Association annual meeting, Los Angeles, October 30.

The speaker, Maj. Gen. Frank D. Merrill, commissioner of highways of New Hampshire, denounced name callers and attackers who have stirred up trouble between these two groups by such slogans as "big trucks are ruining our highways." General Merrill held that the problem must be solved by technical men of the industries involved—automotive, highway, truck transport—rather than by legislators who cannot know the complexities in detail.

★ Mechanical sod cutter trims curb overhang at rapid rate

How Texas Engineers

SWAP IDEAS

Monthly bulletin serves as an exchange of ideas, methods and experiences among the twenty-five districts of the Texas Highway Department.

ONE of the few state highway employee publications that do anything to advance road technology is the Texas Highway Department's "Construction and Maintenance Bulletin." This periodical is very popular and justly so. Issued monthly with some 40 pages of pictures and facts from office and field, it represents the joint effort of the Maintenance, Equipment and Procurement, Construction and Traffic Services divisions of the department, under direction of the Chief Engineer, Construction and Maintenance.

With permission, Roads and Streets presents a few highlights from recent issues:

Sod Cutter. A shop-built edging machine for cutting sod along curbs is described by J. M. York, assistant district engineer at Lufkin. Mounted on a Ford tractor the device includes a steel disc and a stout ripper tooth, held in working position about 3 ft. out on the left side of the tractor by means of a welded steel frame. It operates at 3 to 4 mph., and gets a lot of curbs trimmed free of overhanging sod growth in a day's time.

Patching with Premix. In West Texas, maintenance workers locate slight bumps and depressions by driving along at 50 mph. When a bad spot is felt, the driver honks, and a man in the rear of the pick-up throws out a handful of wet lime mixture to mark the location. The patching crew then follows, more carefully outlining the area with emulsion. This he does by tracing the contour of the dip or bump by slowly moving a taut 60-ft. wire across the road, the wire kept parallel to the road axis.

The area then gets a tack coat of emulsion and a build-up with premix which is hand raked, floated and rolled. If the patch is thin, a coat of emulsion about 8 in. wide is placed around the edges to discourage raveling. A 6-man team with two trucks specializes in such work in this district.

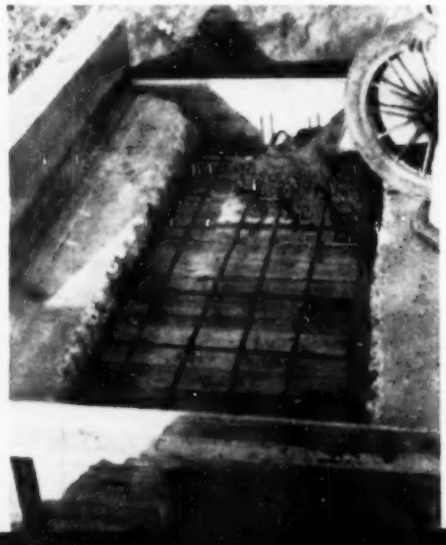
Extending Culverts. Recognizing the job of extending concrete box culverts as a pesky chore, Roy Johnson, senior maintenance superintendent, Atlanta, Texas, tells how his district does it in connection with road widening. Eight boxes ranging from 2 x 3 ft. to as large as 8 x 5 ft., were beheaded near the end by means of air drills and pavement breaker. The culvert end, complete with parapet and wings and apron, were moved out to new position, new reinforcing welded to the stubs, the new barrel length concreted, and the job was done. The eight culverts were thus lengthened at a cost of $2,900 utilizing only half the concrete compared with alternate methods. This method saves time as well as indicating other economies.

Brush vs. Sight Distance. A brush clearing job was done along curves of U. S. 277 in district 22 around Del Rio. As described by senior maintenance foreman C. W. Batchelor, this program resulted in increasing sight distance from a former 700 ft. to a present 1,200 ft. A corollary result was to render unnecessary about 3 miles of yellow dash pavement striping. Where necessary, brush clearing extended beyond the right of way, in which case the land owner's signature was obtained to a simple permit form. Brush stumps were treated with kerosene or diesel fuel, an effective retardant to brush growth, especially mesquite.

Pavement Breaker. Production and cost figures for breaking up concrete patch areas with an Ottawa Hydra Hammer are published by J. W. Craven, district maintenance engineer, Paris, Texas. This pneumatic-tire-mounted, hydraulically - controlled drop hamper rig was leased for $4 an hour. During a 3-month period 1,650 sq. yd. of patching was done at a cost of $7.60 per sq. yd., including removal of old pavement and placing cement-treated flexible base and cold mix asphaltic concrete. Another 1,400-yd. job in the district, done with hand-operated pavement breakers, cost $11.75 per sq. yd.

Weed Burner. Milton Hayes, senior maintenance superintendent, Beaumont, describes a shop-built weed burner for roadside use. It consists of an air-cooled motor, blower and burner mounted on a 2-wheeled trailer pulled by a small tractor. The burner can be rotated on a three-quarter turn and adjusted for height, usually working about a foot off the ground and

★ Before and after moving a culvert headwall after cutting through the concrete



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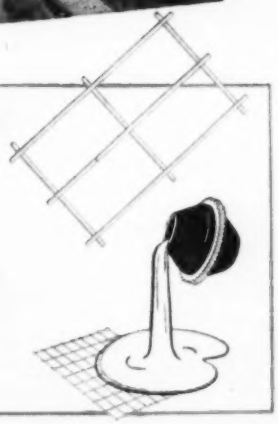

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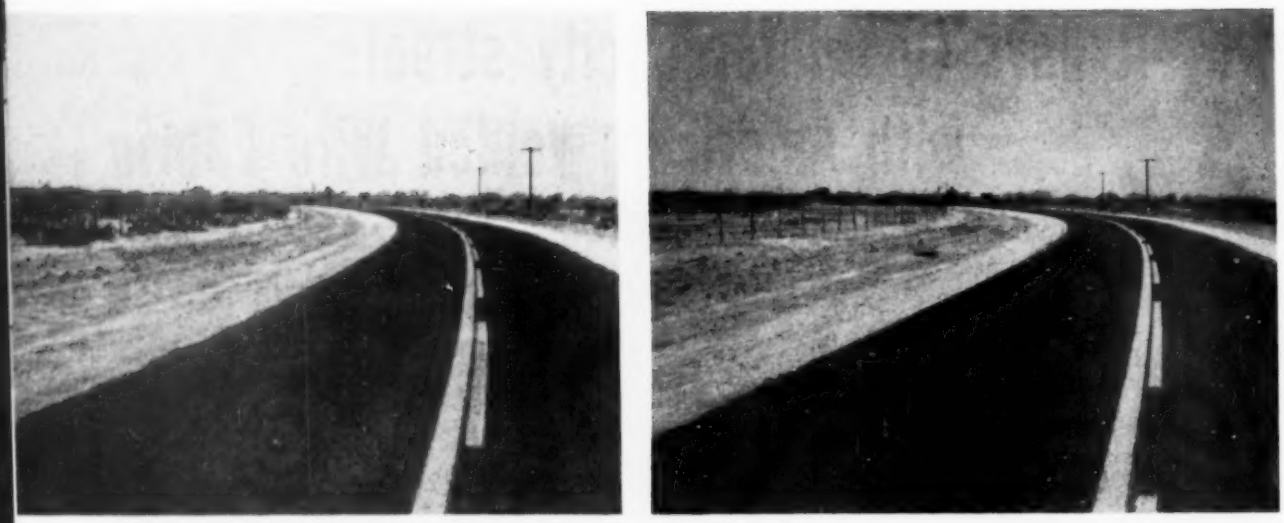


★ Before and after "dolighting" a curve by removing roadside brush

★ Hydraulic rammer helped cut pavement repair costs

★ Here is the weed burner described in the Texas report

covering a 5-ft. width. The first trip on green or damp vegetation is usually made at about 2 mph. A second trip at 6 mph. is made after a couple of weeks, or when the stuff is thoroughly dry. A water truck follows as a precaution should any fires stray beyond the right of way. The machine burns about 50 gallons of diesel fuel per hour.

Short Tripod. Why not devise a tripod with legs only about 18 in. long, for use out on wind swept bridge jobs? So reasons Thomas R. Rideout, resident engineer, Atlanta, Texas, who tells of his special tripod. It enables the instrument-man to sit or kneel while setting grades, or he can rest the tripod on girder tops. The diminutive unit is easier to tote up and down ladders and scaffolds.

Flags on Equipment. As an encouragement to keep maintenance equipment properly flagged, R. N. Jennings, district maintenance engineer, San Angelo, presents pictures of good examples. Never less than a flag on each side. One pneumatic roller was decked out with six fluttering red flags, to augment the yellow paint in warning motorists.

Grid Rollers. Mack Hodges, district engineer at Del Rio, tells of experiences with a grid roller in breaking up old base materials for processing. Using a leased machine as a try-out, he experimented with proper weighting, finding that an 18,000-lb. load of solid steel shafting on this 12,000-lb. unit worked best for the hard, dry caliche encountered.

During placement of the first layer of caliche, much coarse material could not be properly pulverized due to the soft ground beneath. This oversize material later was brought out from the ditch onto the compacted first course, where another use of the grid roller was effective in breaking the material down.

★ Stages in use of grid roller to break up caliche

Engineer Productivity. Noting that there's no hesitancy in furnishing a maintenance worker with a $3,000 truck, frequently renewed, an analogy by former chief planning engineer Herbert Eldridge is discussed by C. C. Cagle, senior resident engineer at Paris, Texas. His thesis is that larger future road programs must probably be handled by an engineering staff no larger than the present one. So every effort should be made to give office personnel such efficiency boosting aids as privacy, quiet, good lighting, air conditioning, the best in office equipment. Management experts in industry have proved that such aids, costing only 2 or 3 per cent of the payroll, can step worker efficiency as much as 35 per cent, help morale, cut down turnover, etc.

Gas tax increase proposed for New York

An increase in New York's state gasoline tax will be recommended, as an aid in financing a multi-million-dollar expansion in roadbuilding. This is the outlook following a meeting of the temporary State Commission on Highway Financing at Albany October 2. Charles H. Diefendorf of Buffalo is chairman of the commission. His statement that "highway user taxes must be increased," confirms the belief that Governor Dewey will back the $2.8 billion road plan suggested by the state department of public works.

The proposed gas tax increase from a present 4 cent level to 6 cents would net an additional $50 million annually for roads. Bond financing is also discussed as one means of raising the total of $280 million annually needed for revamping the state road system. Superintendent of public works, B. D. Tallamy, outlined the state program, which would entail construction on 29,445 miles of highways of all classifications.

Road tax diversion hit by petroleum leaders

The continued wide-spread diversion of highway funds for non-highway purposes was cited at the American Petroleum Industries annual meeting, held the week of Nov. 10 at Chicago.

More than a billion dollars of such diversion of state road taxes occurred in the five years preceding 1952, said John H. Bivins, of New York, committee chairman. An all-time high in this practice was reached in 1951, when $267 million was diverted. Such fund side-tracking is linked closely with congestion and highway deficiencies, said this speaker.

The trend toward state constitutional amendments to forbid diversion (21 states) has started a downgrade of the national total, but some states still divert very large sums. Illinois diverted $1,243,000 in 1952, and has taken $95 million since 1932. New York is the prize state, having diverted $938 million since 1924. Delaware's 1952 diversion was 42 per cent or its road funds; Rhode Island's 39 per cent; New Jersey's, 22 per cent.

Illinois toll body named

Judge Evan Howell of Springfield, Ill., has resigned from the U. S. Court of Claims to become chairman of the new Illinois Toll Road Commission, with headquarters at Springfield. The other two members of the commission are Chauncey McCormick of Chicago, a director of the International Harvester Co., and Orville Taylor, Chicago attorney. The commission's first undertaking will be an inspection tour of superhighways in six eastern states.

• Traffic volumes continue upward, according to U. S. Bureau of Public Roads estimates. The 1952 total road and street travel of 517 billion vehicle-miles is 5.4% higher than the 1951 figure, and 55% over 1941.

★ Short-legged tripid—a convenience on structure work

★ Flags all over—the motorist can't miss this warning

Broad Highway Research Program Launched in Texas

THE Texas State Highway Commission and the board of directors of the Texas A and M College System have announced establishment of a Highway Transportation Research program for Texas. The announcement was made jointly by D. C. Greer, State Highway Engineer, and M. T. Harrington, Chancellor of the Texas A and M College System.

Technical staffs of both organizations will work on research problems covering all phases of highway activity, including economics, materials, specifications, design, construction and maintenance. Existing laboratories of all parts of the A and M System will be available for the studies and new facilities for the work have already been authorized by the System board.

Thomas H. MacDonald, recently retired as head of the U. S. Bureau of Public Roads, which position he held for many years, has accepted the position of Distinguished Research Engineer with the A and M System to work in this program.

Mr. MacDonald, generally recognized as a world-wide authority on highway matters, has been working in Texas since shortly after his Washington retirement, making preliminary plans for the highway research organization. Associated with him in this work is Gibb Gilchrist, long-time State Highway Engineer for Texas, retired recently as Chancellor of Texas A and M.

A proposal for this joint research undertaking was made by the A and M System and accepted by the State Highway Commission which designated the System as the official research agency for the Department. The Legislature has duly authorized the expenditure of Highway Department funds for research in this joint undertaking.

Plan New Center

An appropriation has been made by the A and M board for the construction of a building to serve as a center for the research program and plans are in progress.

Work of the program is to be undertaken on a project basis, with the joint approval of the State Highway Engineer and the Chancellor of the Texas A and M System required on each project. Projects will be proposed by members of both organizations' staffs through their respective heads. Once a project has received joint approval, a project leader will be appointed and a research staff necessary to carry out work selected.

Staff members from all parts of the A and M System, the Highway Department and other schools and agencies, are eligible to work on projects where they are best fitted. The A and M System will make available its equipment and research laboratories without rental or depreciation charges.

Projects already approved under this program include a study of customer requirements of highway transportation, a study of the capacity of weak sub-strata soils such as those found along the lower coastal areas and river valleys to carry embankments for highways, inspection of welds in structural steel by gamma ray techniques, design of underreamed footings, improvement of asphaltic materials, a survey of library facilities available for the program and a study of the integration of highway, rail and air transportation and development. Many other projects are being studied for possible activation.

In discussing preliminary plans for the work, Mr. MacDonald pointed out that it must be broad in scope, covering economic and social factors involved in highway transportation as well as seeking solutions to immediate problems in design, maintenance and construction.

"Approaching this work through a study of customer requirements is fundamental in our thinking," he said. "We need to know, for example, what use is now being made of our highways by Texas industries, and from this to attempt to determine how these needs will grow as Texas industry grows. Highway planning must be long-range and it is necessary that we have some accurate estimate of future needs as a basis for sound planning."

State Highway Engineer D. C. Greer pointed out that the development of a sound research program of this type fits a particular need of the State Highway Department at this time as well as meeting its long-range objectives.

"As it becomes increasingly necessary for agencies of the State to conduct better work on the same or less money," he said, "the need for seeking new means of doing the job more efficiently increases. We expect this research program to pay dollar dividends to Texas through the development of more efficient methods and the improvement of our highway program planning."

What is research?

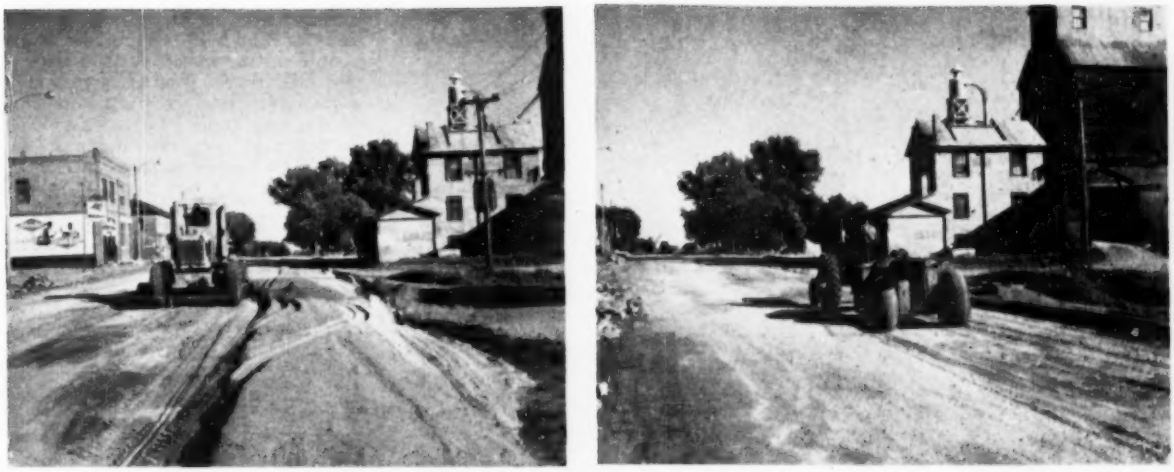
Says Charles Kettering of General Motors: " 'Research' is a high-hat word that scares a lot of people. It needn't. It is rather simple. Essentially, it is nothing but a state of mind—a friendly, welcoming attitude toward change. Going out to look for a change instead of waiting for it to come. Research, for practical men, is an effort to do things better and not to be caught asleep at the switch. The research state of mind can apply to anything: personal affairs or any kind of business, big or little. It is the problem-solving mind as contrasted with the let-well-enough-alone mind. It is the composer mind instead of the fiddler mind. It is the 'tomorrow' mind instead of the 'yesterday' mind."

Fatalities on straight roads

Seventy-seven per cent of the fatal motor vehicle accidents during 1952 occurred on straight roads, according to the 1953 edition of "Accident Facts," the statistical yearbook of the National Safety Council. Unfavorable road conditions, such as wet, muddy, snowy or icy surfaces were reported in only one out of five fatal accidents.

• **Chester A. Burns** has retired as assistant state highway engineer of New Jersey, after 36 years with the department. Previously as district engineer he supervised many metropolitan projects in the North New Jersey area.

★ To head Texas research program: Gib Gilchrist, retired chancellor of Texas A & M; D. C. Greer, state highway engineer; Thos. H. MacDonald, retired commissioner U. S. Bureau of Public Roads



★ Spreading and rolling stabilized sand base material for reconstructing and widening a state trunk highway No. 9 through a small wayside village in Minnesota

How Minnesota Aids in Urban Widening

By O. L. Kipp

Assistant Commissioner and Deputy Chief Engineer
Minnesota Department of Highways
St. Paul

THE EFFECTIVENESS of any trunk highway for long and middle distance travel depends on how well traffic is accommodated through the communities en route. In Minnesota, good progress has been achieved in relieving small-city bottlenecks as a result of the Department of Highways policy of cooperatively constructing extra-width pavement through villages and cities.

Under a 1945 Minnesota law a municipality "may enter into an agreement with the Commissioner of Highways for the construction of a roadway or structure of greater width or capacity than necessary to accommodate the normal trunk highway traffic upon any trunk highway within its boundaries; and may appropriate from any funds available and pay into the trunk highway fund such sums of money as may be agreed upon." A similar provision covers maintenance.

Under this law, and on request of the municipality, it has been the policy of this department to enter into agreements under which the state pays 75 per cent and the municipality 25 per cent of the cost of surfacing the extra width required, together with curb and gutter and miscellaneous items incidental to these phases. Following are some of the rules of procedure adopted to systematize this work:

1. Each cooperative project must be initiated by a Resolution from the governing body of the municipality requesting the improvement and agreeing to share the cost of the extra work. A form sheet has been prepared for this purpose.

2. The trunk highway right of way width is determined by the Department.

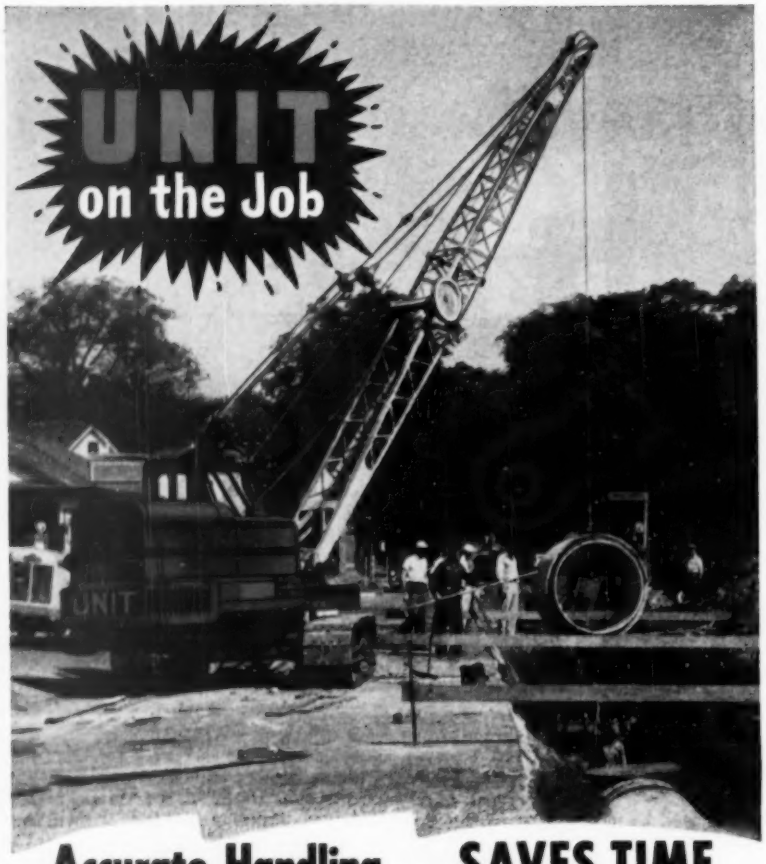
3. Work may be included in the plans which is outside of the trunk highway right of way line, if such work is necessary to complete the job. (For instance, cut and fill slopes.) Permits or easements, where necessary, are secured by the municipality. A copy of each must be furnished to the Department before the construction contract is awarded.

4. Agreements with municipalities must provide for their participation in construction and also in future maintenance of the completed work.

5. Storm sewers required for surface drainage of the trunk highway, and also serving the municipality, qualify for state participation in proportion to the ratio of trunk highway area drained to the total area drained. The municipality must obtain and pay for all easements and construction permits.

6. Sidewalks may be included in

★ New parking lanes and curbs help spruce up the town and give traffic more elbow room. And through traffic is expedited by Minnesota's cooperative arrangement. Trunk highway 61-55, Hastings, Minn.



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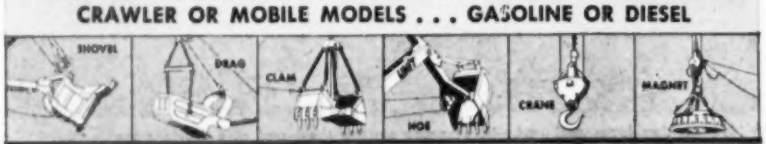

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the construction as part of the 75%-25% portion only where the design requirements make replacement of the old sidewalk necessary. New sidewalk which does not fall within the above limitations may be included in the plan for construction if municipality agrees to pay full cost.

City Finances Extra Width

7. Where traffic on the trunk highways approaching the municipality requires two traffic lanes, state participation is on the basis of 100% for the middle 24 feet for bituminous surfacing or 22 or 24 feet for concrete surfacing, plus 75% of the cost outside of the selected middle width up to 50 feet between curb faces. If greater width appears desirable from a local standpoint, the municipality must finance the additional width. Unless unusual conditions exist the state requires a minimum width of 44 feet between curbs for two-lane traffic design.

Where design for trunk highway traffic justifies four lanes, the state will pay 100% of the cost of the middle 44 to 48 feet, depending upon the required trunk highway lane width and type of surfacing, plus 75% of the cost outside of the selected middle width up to 72 feet between curb faces.

Desirable minimum width is 16 ft. in excess of the selected width of the four truck highway traffic lanes.

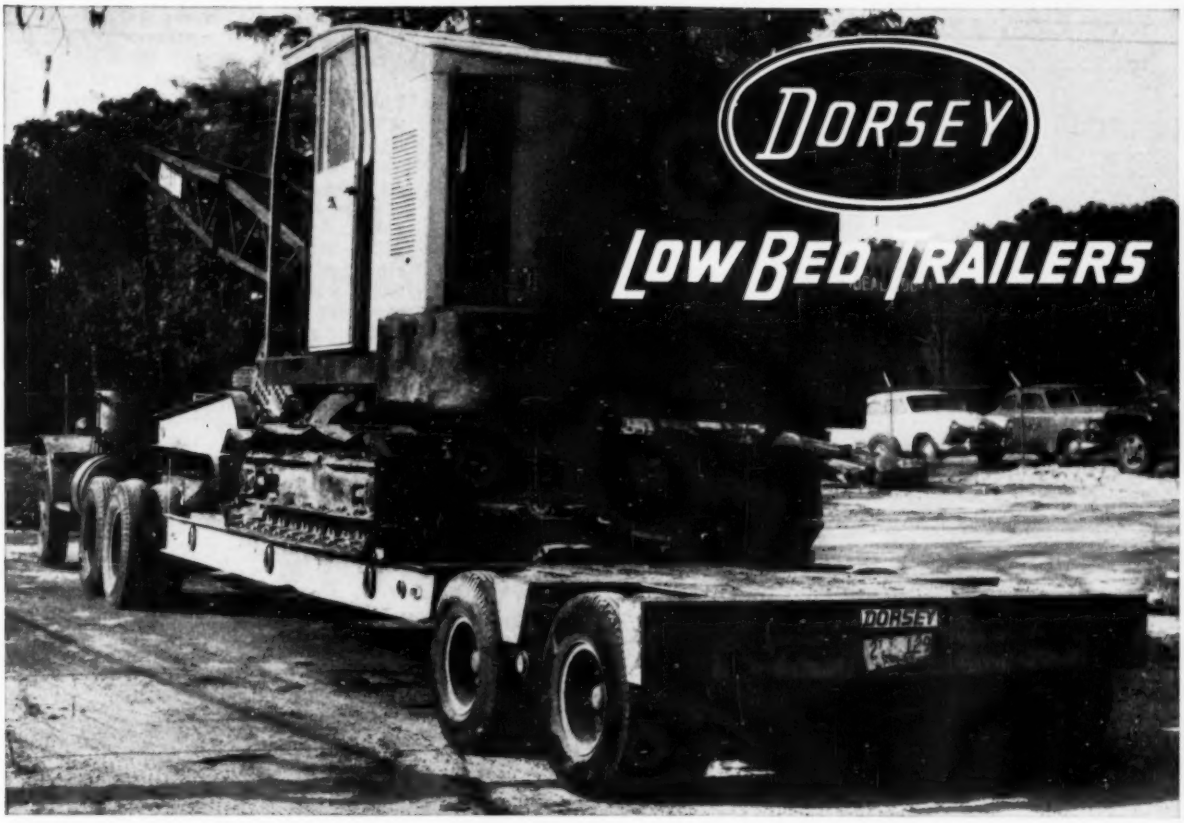
If a center island is constructed the state will pay 100% of its cost in addition to 100% for the 44 to 48 foot surfacing.

8. The cost of moving municipally-owned utilities is considered a part of the project on a 75%-25% basis. The municipality does the work and assumes the maintenance. There may be a few instances where the state will be justified in paying 100% of the cost of such moves. One example would be where a new location leaves established streets.

9. If a municipality has qualified engineers available for such purposes, the preliminary engineering work may be done by municipal forces. Or the municipality may employ a Registered Professional Engineer to do the work. The cost of surveys, plans and specifications will usually be assumed by the state on a 100% reimbursement basis.

10. Under certain circumstances, a municipality is permitted to let the contract for construction work. The more common situations are where the municipality is letting other work of its own; or where the construction is of a minor nature or small volume. Definite early understanding must be reached as to which party is going to perform the work and take the various actions. No reimbursement can be made for engineering or construction work performed prior to complete execution of a cooperative agreement between the state and the municipality.

HOW to keep equipment in several places at once . . .



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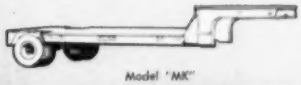

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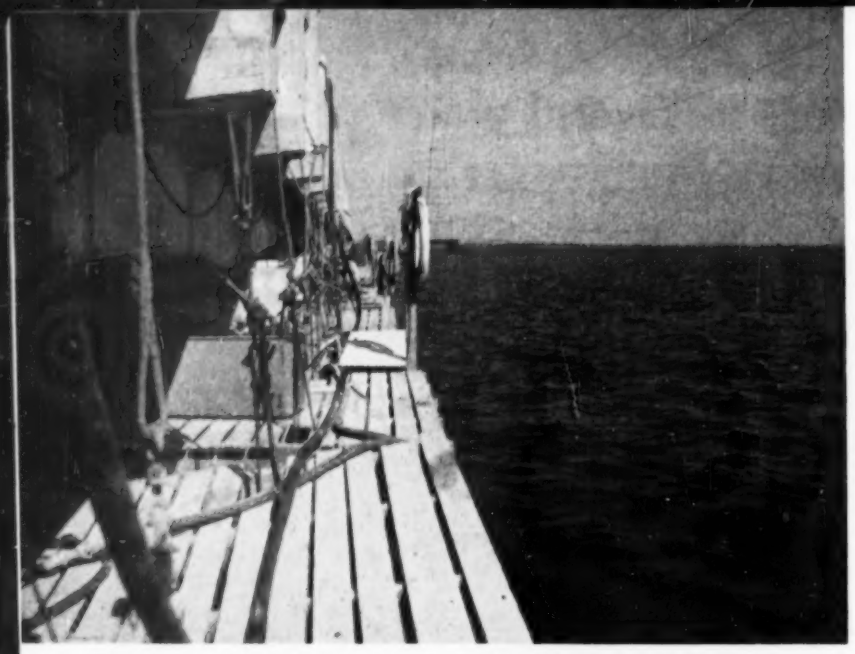


★ Details of ratchet chain hoist suspension of working platforms

caps, girders, and piers was noted almost from the time the bridge was opened. The disintegration was progressive, and the owners commenced repairs by the gunite process in 1936, according to the records obtained by the State when it acquired the bridge. This work was done by contract, generally on a time and material basis. The repairs to the concrete spans consisted of replacing spalled concrete with gunite and encasing cracked piles, caps, and beams with gunite. At several locations the steel in the faces of the truss span piers apparently had insufficient embedment, a condition which necessitated replacement of the steel, and covering with gunite.

An attempt was made to stop the deterioration by spraying a heavy bitumastic coating on the beams, caps, and piles. Neither the gunite encasements nor the bitumastic coatings were effective, and, in 1949, the toll bridge company commenced more

Pilot Guniting Contract · · · MARKS BEGINNING OF REPAIR PROGRAM FOR S. F. BAY TRESTLE

THE seven-mile-long concrete pile trestle spanning the southern end of San Francisco Bay underwent repairs during 1953 in the first of a series of contemplated contract sections.

The San Mateo-Hayward Bridge was built in 1928 and the early part of 1929 and was first opened to traffic on March 3, 1929. It was operated by its owner, a private toll bridge company, until September 12, 1951, when it was acquired by the State of California. The bridge consists of:

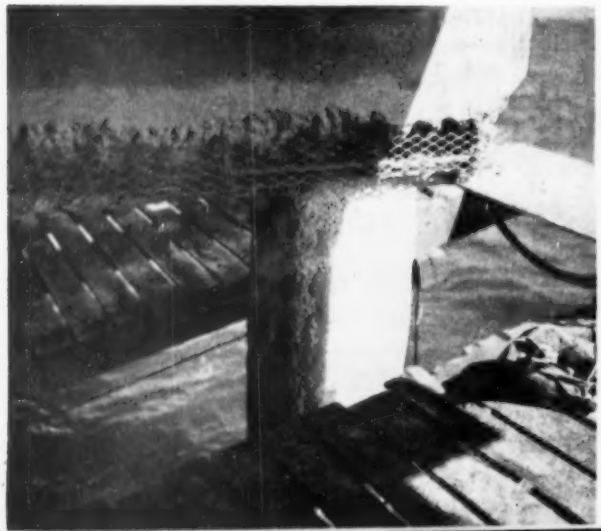
1 truss lift span of 303 ft.
4 fixed truss spans of 300 ft.
116 concrete beam spans of 35 ft.
1,054 concrete beam spans of 30 ft.

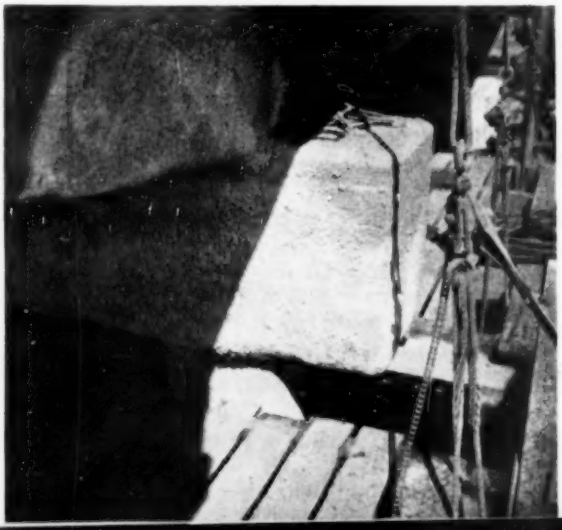
Square concrete piles, 18 x 18 in., were used in most of the bents. There are also some bents with 16 in. square piles. Other bents, where the spans are longer or the water deeper, have piles 24 in. square. In some bents there are batter piles 24 in. square or of a rectangular cross section 20 x 26 in.

Some disintegration of the piles, intensive repair procedures with its own forces. The new procedures were developed under the supervision of the owner's consulting engineers.

Upon acquisition of the bridge by the State, the repairs were continued by State forces, using much the same procedures as those which had been followed by the former owners. In conformance with departmental policy to perform construction by contract, it was decided that some of the work should be carried on by this method if it proved to be feasible and adapt-

★ Showing expanded metal reinforcing in place, and a completed repair area





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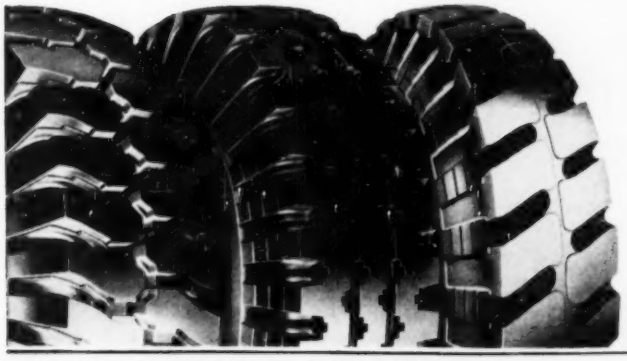

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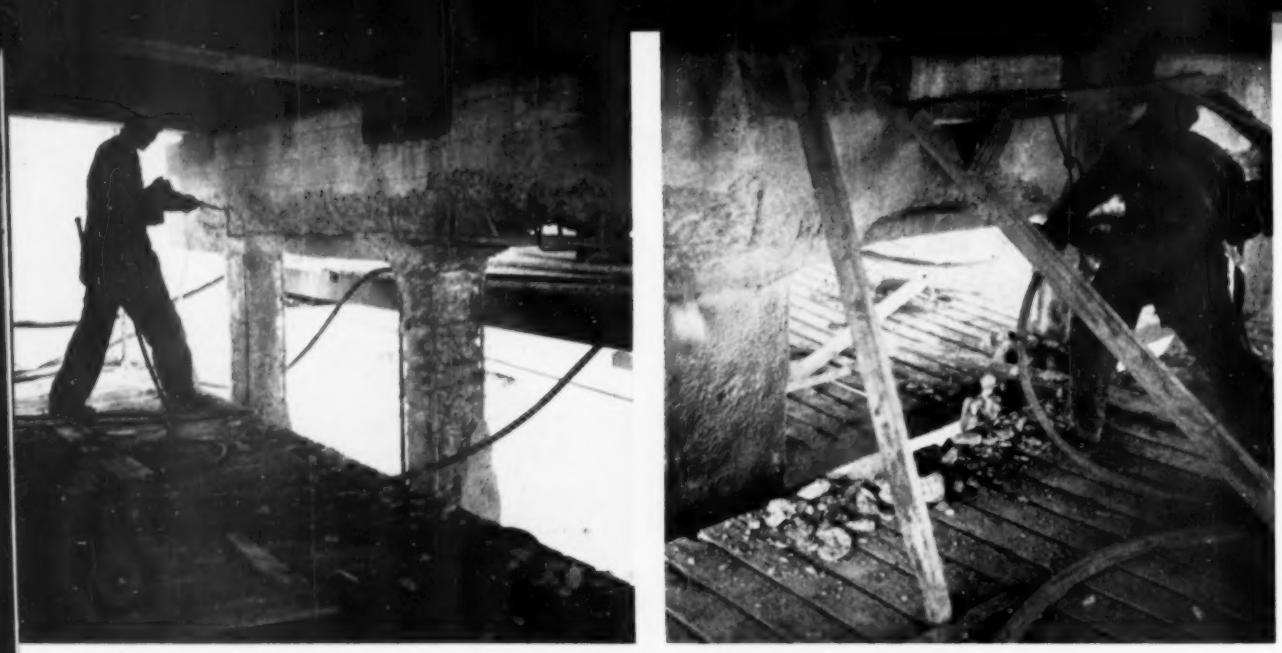


★ Cutting away deteriorated concrete. Jackhammers were often suspended by a rope from a timber as shown

able to the requirements of the repair job, particularly with regard to the setting up of a satisfactory and equitable basis for payment for the work.

Accordingly, contract specifications were drawn up making use of the experience gained from inspection of the former owner's work and from the handling of the work by State forces, as well as the experience of the State Division of Highways in making bridge repairs. Pre-bidding conferences with a number of contractors seemed to indicate that the bidding would be highly speculative. It was decided to call for bids on a unit price basis for a small portion of the bridge in order to minimize possible financial loss to the contractor and also to gain data and experience which would be useful in preparing future larger contracts.

A contract was awarded in May, 1953, to the low bidder, Johnson Western Constructors and Clementina Demolition Company, therefore in the nature of a pilot contract. Five bids were received for the work, ranging from $99,685 to $198,235. The contract covered repairs of specified areas over a selected 1,440 ft. length of the bridge.

Crew and Equipment

The contractors brought in equipment consisting of a sandblasting outfit with 350 cfm. compressor, chipping hammers with 500 cfm. compressor for cutting away deteriorated concrete, and a 500 cfm. compressor and No. 1 cement gun working in conjunction with a Bondactor batcher. The compressors were LeRoi's. The chippers were Thor 17's for getting into the piles and Thor 23's for caps and beams.

The crew of 31 men worked on platforms suspended under the deck by Coffing ratchet chain roists. Working under close inspection the chipper operators cut away all bad looking areas of concrete, until sound concrete was exposed. In many places the ½-in. stirrup bars in the caps and beams and in fewer instances the reinforcement in the piling were found to be so badly rusted that exposed segments were burned away and new steel welded in place.

Part of the repair work included the cutting away of concrete collars placed several years ago around deterioration at the water line. These collars, though strongly built, often had to come off because of deterioration in evidence beneath or immediately adjacent. New collars or encasements were constructed around the piling, using gunite methods.

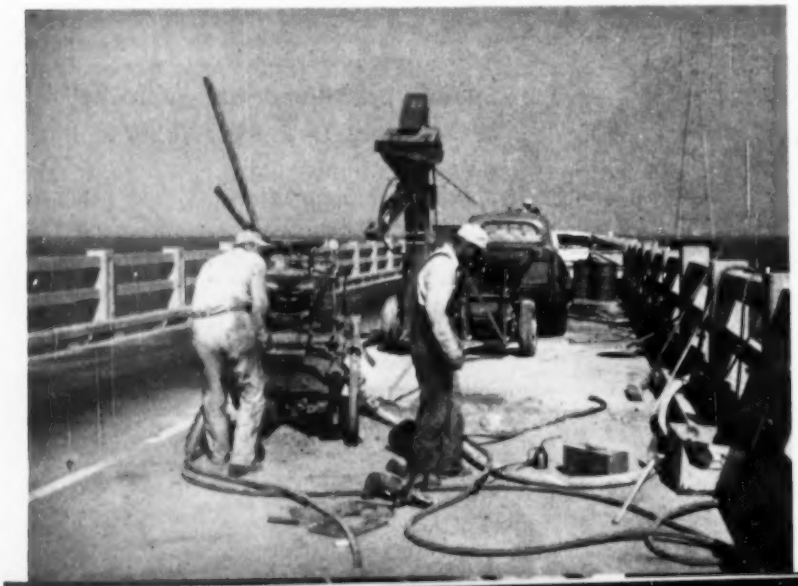
With the surfaces thus prepared, cap repair areas were covered with 1½ x 3½-in., 12-gage expanded metal lath, and pile and beam areas were similarly covered with 2 x 2-in. wire mesh, the reinforcing being tack-welded to the exposed steel.

The guniting was then done with a 3 to 1 mix containing 3 per cent pozzolan materials. Pigmented liquid curing compound was applied by pressure car and hand-held spray.

The bid items, representing the best estimates possible but still somewhat of a guess, included the following:

400 lin. ft. removal existing conc. casements
900 lin. ft. repair of piles, one corner
275 lin. ft. repair of piles, one face
1,900 lin. ft. repair of caps, one corner
175 lin. ft. repair of caps, one face
2,100 lin. ft. repair of beam bottoms
110 lin. ft. repair of beam and cap sides (spots)
1,300 lin. ft. of shotcrete pile encasement
1,500 lb. of reinforcing bars
900 sq. yd. of wire mesh
300 sq. yd. of expanded metal lath

(Continued on page 72)



★ The contractor's guniting machine is seen in the foreground, and batching unit in background

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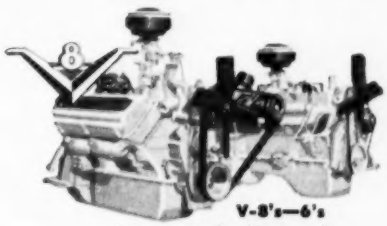

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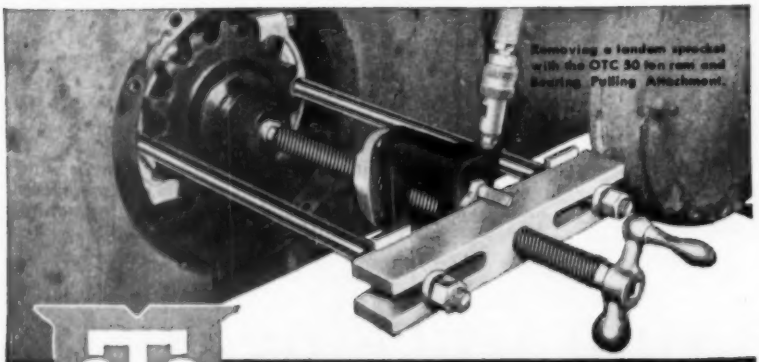

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Enlarged federal aid

(Continued from page 30)

rail tank car delivery, but hasn't proved entirely satisfactory in the present situation involving 85 per cent truck delivery.

F. V. Reagel, Missouri, reported that his department maintains inspectors at the refineries in three shifts, if necessary, as a means of keeping up with the contractors during the busy season. Transports are universal for shipment up to 150 miles, he noted. Contamination is the chief problem, and he has found it necessary that a transport be kept exclusively in service for one asphalt grade. Even with this precaution, the loading valves and pump are a constant source of possible contamination, due to flushing oil.

An Ohio spokesman reported a similar delivery problem, but said that there aren't enough qualified inspectors to work the refineries double-shift.

Lehmann of Louisiana in discussion told of the helpful practice of making preliminary quick tests before leaving the refinery, to see that the material is of proper grade and otherwise within range. A test can be run in 40 minutes covering penetration for asphaltic cements and viscosity for cutbacks. Such tests will prevent the accidental use of the wrong material, and may help detect anything seriously "off."

In Missouri, the state tries to cooperate with contractors to get work out. One detail is to hand the driver a slip as he leaves the refinery, to be given to the engineer on the job reporting that a short-cut test has been made, and that a full test will be completed in such and such a time, with OK by phone or wire to be expected soon.

An important specification detail in Missouri is the requirement that piping be separated when there are two storage tanks on the job, so that each can be controlled independently.

Another Missouri detail of interest reported by Mr. Reagel is the successful use of chemistry students and graduates from the various teachers colleges, as a source of men who can develop into good plant inspectors. Many of the chemistry majors decide they don't want to go into teaching, and are attracted into highway work. Indiana, noted Havey, works a similar scheme by employing medical students as inspectors and technicians.

As a last observation in this lively discussion, another delegate warned against the tendency for contractors or refiners to overheat asphalt so that it will be up to specified temperature on arrival at the job.

Rubber Asphalt Developments

Reports on experiments in the use of rubber in asphalt paving mixtures was made at the materials meeting by E. F. Kelley and H. F. Clemmer.

(Continued on page 74)

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Signature

★ (Left): A stop light was mounted at either end of the work section, supplemented by barriers carrying both flashers and reflector buttons, to govern the alternating one-way traffic through the job. (Another view of the generator equipment and signal control station)

★ Traffic flagman's weather-proof booth. Electric signal control unit is seen on the table. One of the two gasoline-powered generators in corner of picture

Pilot Guniting

(Continued from page 68)

Beside the construction equipment, which was located along one lane of the two-lane deck, the contractor also supplied as a pay item the facilities for traffic control. This included a stop light located at either end of the work, a General Electric signal actuating outfit, and a flagman with weather-proof glass-windowed booth. The signals were powered by means of a Fairbanks-Morse trailer-mounted light plant, with an Onan plant on hand as a standby or alternate unit.

Also used as traffic warning devices were conspicuous yellow barricades each with four red flashers.

The bridge and its maintenance are under the San Francisco-Oakland Bay Bridge department, California Division of Highways, Howard C. Wood, principal bridge engineer.

Of interest in connection with this bridge is the intention of research and material engineers in the California Division of Highways to investigate the fundamental problem of durable concrete construction for salt water exposure.

Bumper to bumper driving major accident cause

A chief source of accidents in metropolitan traffic is traced to the habit of motorists driving "bumper to bumper," according to Col. William S. Chapin, Consulting Engineer of the Tri-Borough Bridge Authority in New York. He outlined some of New York City's traffic shortcomings at the closing session of the annual meeting of the American Bridge, Tunnel and Turnpike Association held in New York October 19-21.

The problem in preventing the close spacing of cars in city traffic is a formidable one, beyond the policing facilities of most cities according to this speaker. Nevertheless the problem must be faced.

Another speaker played down the importance of high speed as a contributory cause of turnpike accidents. Gerard B. Gilbert, assistant to the chairman of the Pennsylvania Turnpike Commission, said that the passenger vehicles involved in rear-end collisions on the turnpike occurred with four times the frequency with cars traveling at less than 50 mph. than with vehicles traveling over 50.

The association officers elected for 1954 are Roy Clippinger of Carmi, Illinois, president; C. E. Kaumeyer, Niagara Falls, Ontario, vice-president; J. Allyn Stearns, White Plains, New York, secretary; and Earle R. Barnard of Charlestown, Massachusetts, treasurer.

New Appointments in Koppers Tar Division. J. Ronald Ray has been named manager of the finance section of the Tar Products Division of Koppers Co., Inc., Pittsburgh, Pa., and Robert L. Woodard has been appointed manager of the central section.

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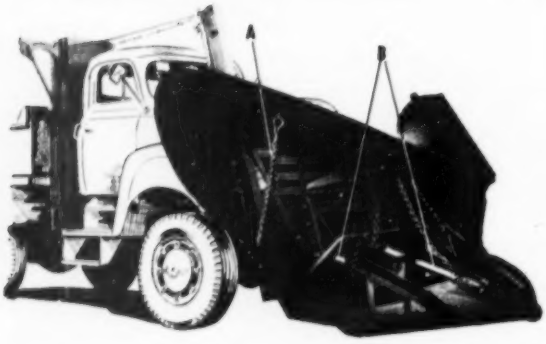

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★ J. Rich Steers

★ Glenway W. Maxon

Steers and Maxon honored by Moles

J. Rich Steers of New York and Glenway W. Maxon of Dayton, Ohio, were named as the 1954 recipients of the awards given annually by The Moles for "outstanding achievement in construction." The Moles, a society of leading figures in the heavy construction industry, in New York City, makes the award each year to one member of the society and to one non-member. It is considered the highest recognition that can be accorded service to the American construction industry. Presentation will be made at a banquet, February 3. Previous recipients include former President Herbert Hoover, Robert Moses, Admiral Ben Moreell and General Brehon B. Somervell.

Freeway paving—Western methods

(Continued from page 25)

ram unit. The ram in turn is mounted in a frame (as pictured) and the whole business suspended by counterweight on an arm built into a Ford-Ferguson tractor.

It might be noted that while the foregoing array of equipment resulted in rapid footage, this project in common with other Los Angeles freeway work has been hampered, from the contractor's viewpoint, by the constant succession of bridges. Particularly on base work, much time and expense are involved in picking up and setting down equipment for the short runs between underpass decks. A 20-ton Northwest truck crane was used to cut moves as short as possible. This crane plus a second crane used for setting forms on trucks, was able to handle all the various form-riding units. Griffith Company has been credited with some of the smoothest-riding concrete built in the California program, well known for its low roughometer indices. T. W. Oglesby has served as project manager for the Ramona Freeway job. B. N. Frykland is resident engineer for the California Division of Highways.

Enlarged federal aid

(Continued from page 70)

Mr. Kelley, who is chief, physical research branch, Bureau of Public Roads, reviewed studies conducted at Bureau laboratories. Rubber asphalt powder blends from fourteen sources were employed, and five such powders selected for extended studies to find the characteristics most effective in changing the qualities of the asphalts.

An over-all conclusion was that no hard and fast claims can be made on the effects of rubber-asphalt compounds, because of variations due to different asphalts as well as various types of rubber. Greatest changes were with natural and type 2 synthetic rubber—least change, with reclaimed, processed, and type 5 synthetic vulcanized, and tire scrap.

Mr. Clemmer gave a resume of experiences in connection with street paving work in Washington, where he is materials engineer for the District of Columbia.

DIGEST of Current Technical Literature

By John C. Black

Ice control: county notes from Michigan

"Frequently more expensive than snow removal" is the characterization applied to ice control operations by a number of county engineers from Michigan—state with no small reputation for winter downfall. The three counties covered in the current article all provide stocks of mixed abrasives and chemicals at strategic points.

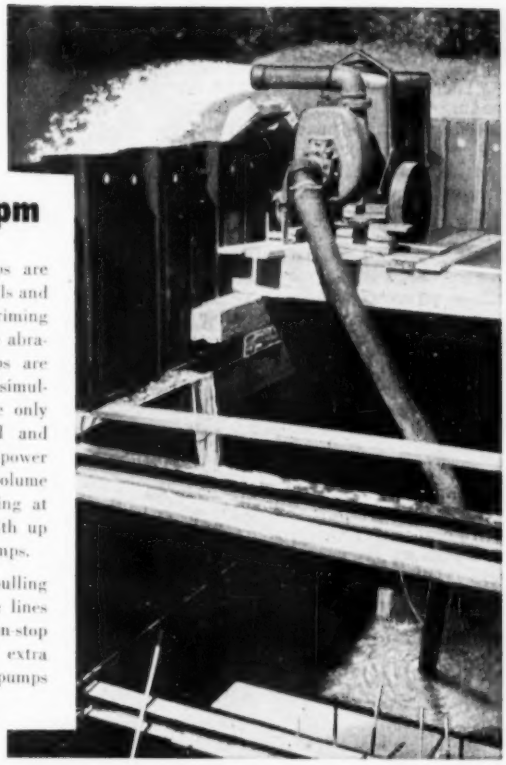
Allegan County uses coarse sand treated with calcium chloride at the rate of 50 lbs. per cu. yd. "For hard clear ice conditions of unusual severity, we resort to application of clear chemicals. With temperature ranges below 26° or 28° F. and moving downward we use calcium chloride. With temperature of 28° F. and moving upward, rock salt provided in 100-lb. bags is used. . . . We find it possible to distribute the chemicals from a low limit of 200 lbs. per mile, upward, to quantities as needed for prevailing conditions."

St. Clair County, with a particularly tough ice problem due to sleet and winter rain, also stocks abrasives (crushed cinders) with 50 lbs. of calcium chloride per yard, but adds another 100 lbs. when abrasives are applied to the roads. "When ice or packed snow does not remove easily, clear rock salt is applied on the straight-away with abrasives added on curves, hills and intersections."

In Marquette County the calcium chloride-sand mix is at 50 lbs. per yard. On days when temperature is 22° or lower, sanding operations are repeated where necessary. With temperatures above 22° F., rock salt is applied to the road surfaces, and when the ice has melted sufficiently, it is removed by blading. A one-way plow removes accumulated melted ice from shoulders. "The chlorided sand is applied at the rate of approximately 2½ cu. yd. per mile for a road surface width of 12 ft. Our records show this application to cost $8.12 per mile." On days of low temperature and high winds, the surface is scraped with a serrated blade before sanding. This not only prevents sand from being blown off the icy surfaces, but tends to stop side slip of vehicles. "Rock salt is applied at the rate of 400 lbs. per mile and in a pattern 4 ft. wide, centered along the center line of the pavement. The cost of this application is approximately $7.00 per mile."

From articles by H. H. Ward, Charles E. Ash, and H. L. Schroeger in HIGHWAYS AND BYWAYS *(published by the County Road Association of Michigan) for February, 1953.*

Jaeger's bigger pumps pull stronger at easy 1200 rpm



Jaeger "Sure Prime" Pumps are built oversize with larger shells and impellers. They hold more priming water and are subject to less abrasive wear. These big pumps are designed with 2 independent, simultaneous priming actions, the only positive self-lubricating seal and engines of the largest horsepower applicable. They deliver full volume at an easy 1200 rpm, priming at only 1400 rpm compared with up to 2000 rpm for ordinary pumps.

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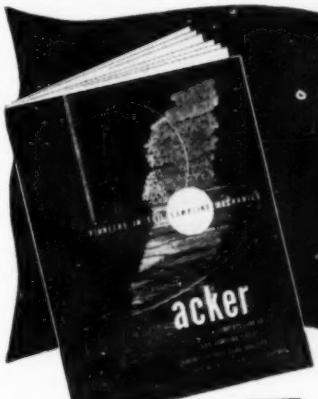

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Frost as a factor in pavement design

"The increases in traffic and wheel loadings on airfield and highway pavements in the past 10 to 15 years; the rising costs of pavement construction, maintenance, and repair; the greater need for maintaining pavements in fully serviceable condition at all times; and the increasing of operating speeds have made it necessary to consider frost action in greater detail in pavement design. This paper describes criteria formulated by the Corps of Engineers to meet the needs of its construction in areas of seasonal frost.

"The variation of subgrade strength through the seasons is illustrated, and it is indicated that the frost-melting period is critical when conditions are conducive to active frost action. Methods for recognition of conditions of soil, temperature, and moisture which result in detrimental frost action are described. Base composition requirements are given. Load design charts for airfield and highway flexible pavements for various types of loadings are presented. Load design criteria for rigid pavements are also given. The application of these methods is illustrated by means of design examples. Needed studies to further improve the present design criteria are discussed."

From a paper by Kenneth A. Linell presented at the thirty-second annual meeting of the Highway Research Board, and published in BULLETIN No. 71.

Strain measurement in concrete pavements

Investigations conducted to develop a better method of adapting SR-4 electrical resistance gages for measuring strains in concrete pavement are described. Previous experiments with this type of cell indicated the need of some new water-proofing technique to extend their life in service.

"SR-4 gages having a 6-in. gage length were found to indicate strain values which were much more consistent than did shorter gage lengths when used on concrete containing coarse aggregate.

"A number of experimental cells were made and tested before one was developed that measured strains satisfactorily. The SR-4 gages for this gage cell were cemented between the flattened walls of an expanded portion of 5/32- or 3/16-in. copper tubing. The copper tubing extended the length of the gage leads and was filled with Petrosene wax to keep moisture from entering the gage cell.

"Specimens in which these thin-walled copper gage cells were cast were tested in the laboratory in compression and in flexure. Strains measured with internal gages compared favorably with those found by similar surface gages with no apparent reinforcing of the concrete by the gage cells. Consistency of strain values indicate a good bond between concrete and gage cell.

"Two rosettes of two gages each were cast in a pavement and a strain investigation was made to determine the workability of these gages. Strains due to a 20,000-lb. axle moving load at various speeds and in several wheel lanes were recorded satisfactorily.

"After having been installed in a concrete pavement for ten months the gages have manifested no decrease in gage to cell resistance. It is believed that gages of this type are waterproof and will remain serviceable for a long time."

From a paper by Herbert E. Worley and Richard C. Meyer (Respectively Soils Research Engineer and Electronics Engineer, State Highway Commission of Kansas) in the JOURNAL OF THE AMERICAN CONCRETE INSTITUTE, *October, 1953.*

Traffic line paints tested and rated

An interesting suggestion for the economic comparision of traffic line costs, based partly on studies made in this country, comes from Canada as an item in an article treating broadly of the traffic problems of Canadian cities. The "Washington formula," used in Providence, Rhode Island, is the basis of recommendations.

Under the plan, a test point (usually, a busy section of road) is selected and each bidder asked to lay one gallon of paint in parallel lines across it, all samples being put down at the same time to insure equal exposure to traffic. Thereafter inspections are made about once a week for a period of three months. Different inspectors should be used. Samples are rated on appearance, a maximum of 10 points being given for a near perfect line and zero for an erased stripe. Final rating for a sample is the average rating of all its stripes. Samples rating below five should be rejected.

Samples are then compared by applying the following formula to each: $C=158{,}400\left[(P+A)\div F\left\{5D/(10-R)\right\}\right]$ in which C is the cost per mile per month of useful life, in dollars and fraction thereof; P is the price per gallon of paint, in dollars and fraction thereof; A is the application cost per gallon of paint and fraction thereof; D is the number of days of the test; R is the average rating compiled by different inspectors; F is the number of feet covered in the test per gallon of paint.

Example: Suppose a particular sample costs $4.00 a gallon and the application cost is $0.20, that the test took 3 months or 90 days, the average rating was found to be 7 and the total footage covered by one gallon on the test day was 300 ft. for the given sample. Therefore, the cost per mile per month of useful life of the said sample will be:

$$C=158{,}400\times\left[(4.00+0.20)\div\left\{(5\times90)\ /(10-7)\times300\right\}\right]$$
$$=\$14.80.$$

This sample will, therefore, cost $14.80 per mile per month of useful life."

To save motorists from confusion, a warning sign should be set up, reading "Pavement Marking Test Ahead."

From an article by Jacques Barriere, Traffic Engineer, City of Montreal, in ROADS AND ENGINEERING CONSTRUCTION, *Toronto, October, 1953.*

Psychology and the road crew

As an economic problem, the question of mass production vs. personal interest and pride of workmanship is often a puzzler, with trial and error as the only method of solution. The subject may be worth more careful attention by road executives.

"A new technique for carrying out road maintenance has been brought into some districts with a certain amount of success. Since the war it has been found necessary to carry out the tending of roadsides by means of mobile gangs. One of the disadvantages of this system was that men lost their feeling of personal responsibility for their own lengths and their local knowledge was not used to advantage. Districts have therefore been divided into sectors of about 60 miles each, and a small mobile gang, equipped with as many machines and tools as possible, is put in charge."

From an article by J. H. H. Wilkes in the September, 1953 issue of ROADS AND ROAD CONSTRUCTION, *London.*

Wind loads on truss bridges

Tests on scale models of truss bridges for the Corps of Engineers, U. S. Army were conducted in Wright Brothers Wind Tunnel at M. I. T. under the supervision of John M. Cord and Warren B. Delano of the Department of Civil and Sanitary Engineering. Analyses and results are reported by John M. Biggs, Ass't Prof. of Structural Engineering, M. I. T., with conclusions as follows.

"The following conclusions apply only to simple span truss bridges with proportions similar to those of the model tested:

(1) Wind pressures of 30 and 50 lbs. per sq. ft. on a single truss completely separate from other parts of the structure correspond to wind velocities of approximately 85 and 100 mph respectively.

(2) The spacing of trusses has considerable effect on wind loads. This fact is ignored by specifications. As the spacing increases from 13.3 ft. to 60 ft. the load on the leeward truss

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**Optional at extra cost. Ride Control Seat is standard on C.O.E. models, available on all other cab models as extra equipment. Rear corner windows in standard cab, optional at extra cost.*

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C-19

varies from 40% to 77% of that on the windward truss.

(3) The effect of the floor system on total horizontal load is generally small and bears little relation to the unshielded elevation area, a quantity which is considered by most specifications. The effect does, however, increase with the vertical distance from the floor to the truss chord.

(4) Lift and the resulting overturning moment are small on railroad bridges but may be of considerable importance on wide highway spans. On the relatively narrow two-lane bridge the overturning moment is 50% greater than that normally used in design.

(5) In order to achieve accurate wind tunnel tests it is not necessary to construct large-scale bridge models which include minute details of fabrication."

From a paper by John M. Biggs in PROCEEDINGS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS, *July, 1953.*

Wet-sand bituminous process for quick construction

First developed by the Shell Petroleum Co. during the war, the "wet-sand mix" process was used with success for rapid runway construction on U. K. airfields. More recent experience in Holland, Belgium, and France confirmed its practical value in road-building. At Seria, Borneo, nearly 10 mi. (16 km.) or about 100,000 sq. yd. (84,000 sq. m.) of road have been laid with this process and a further program is now under way.

The first stage consisted in the preparation of the roadbed, in most places entailing the removal of decayed vegetation. Sand was then transported from the shore by sand pump or other means to form an embankment at least 2 ft. above the highest level of the water table. Adequate side drainage was constructed in order to ensure a quick discharge of surface water during tropical rain storms. The wet-sand mixture, consisting of 91% sand, 4% hydrated lime as an activator, and 5% special cutback bitumen, was then spread over the subgrade by rakes to a depth of 4½ in. and was consolidated by rollers.

After a curing period of from 2 to 3 weeks, during which the roads received occasional rolling in addition to normal light traffic, a seal coat of cutback bitumen was applied and covered with a sand-and-crusher-fines mixture after which the roads were opened to all types of traffic, including occasional trucks carrying 20-to-25 tons of material. This treatment proved to be adequate and satisfactory for the medium traffic roads, but in the case of roads carrying intensive heavy traffic, it became the normal practice to lay a 2½-in.-thick

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COMMENT
from the BUTLER ENGINEER

of Barbers . . . . Roadbuilders and Aspirin

Stuck my head in a barber shop. Saw one empty chair, barber there waiting. So I sat down in his chair. The barber *at my right* said,

"It'll be only one minute, sir."

I turned and took a good look at the barber in back of me . . . it was a dummy!

"Whatinhell!" I said.

The live barber finished with his customer and moved over to me explaining,

"We've noticed lately that people will look in the door and if there isn't a barber ready, they'll go right out. With the dummy here they stay. But everyone's in a hurry — too keyed up today. Can't stand the thought of waiting a few minutes."

"Great Day!" I said, "What a commentary on modern living!"

"Isn't it!" said the barber as he moved the dummy to the next chair.

Well, it's strictly no fun waiting for a new Roadbuilders' Plant when you've got a job ready to go. The roadbuilding volume will be just as big in '54 (perhaps bigger). You're sure of successful bids, lower costs and better profits with a Butler Plant. So, be safe! Order your plant now for a specified delivery date this Spring. Don't get a job and then wring your hands and our neck for a plant.

At the Metal Show I saw an exhibit with a counter simply loaded with aspirin, Bromo Seltzer, Alka Seltzer — every such remedy known. A sign said "HEADACHE CORNER — help yourself" . . . Made me think of myself — the Butler Engineer. But we don't cure headaches — *we prevent 'em,* for you, that is.

We'll all build more — in 54.

The Butler Engineer

BUTLER BIN COMPANY
WAUKESHA, WISCONSIN

chipping carpet, composed of ¾ in. of wet gravel mixed with special cutback and lime, after a period of 3 to 6 mo. This carpet had an open-textured surface and therefore required a seal coat at an early date. This final coat consisted of a spray application of cutback bitumen covered with ½-in. chippings, obtained from the Seria crushing plant.

From HIGHWAY RESEARCH ABSTRACTS, *July, 1953.* [*Civil Engineering (London), Vol. 48, No. 563, p. 454, May, 1953.*]

Another instance of value in old macadam

Several sections of unreinforced concrete in the state of New Jersey which were constructed more than thirty years ago directly on old macadam roads that had been scarified and reshaped to the new grade line have given, and are still giving, satisfactory service under very heavy traffic. One of them, a section of Route 27, Old Lincoln Highway, carried a volume of more than 35,000 vehicles daily.

New construction of comparable character is the 10-in. concrete, unreinforced and without load transfer devices, now being laid on exceptionally stable subbase materials, of which the upper 4 in. is composed of very thoroughly compacted crusher-run stone. This modern type has groove-type contraction joints at 15-ft. intervals, but no expansion joints. The close joint spacing results in very small openings (about 1/16 in.) and consequently good aggregate interlock.

From a paper by E. W. Kilpatrick, State Highway Engineer of New Jersey, presented at the 29th annual convention of the Association of Highway Officials of the North Atlantic States and published in the Proceedings of the Association.

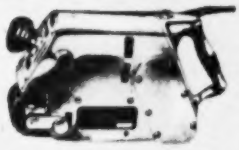
Total effectiveness of underfill blasting of peat

From Tattynuckle, Ireland, comes the following note on the displacement of peat by "underfill blasting" to provide a solid foundation for more stable material. This method is considered better than "toe-shooting" under certain conditions. In the United States and Canada both methods have been used with varying details in procedure.

"The usual procedure with underfill blasting methods is first to construct the sand fill on the peat. Holes are then jetted through the sand into the peat and explosive charges are placed at the bottom of the holes.

"On blowing the charges the peat is displaced sideways, and the fill falls into the gap left by the displaced peat.

"As the filling was stony the charges were placed in the peat at Tattynuckle



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When you add a Sauerman Crescent Scraper to your boom machine as auxiliary equipment, you are making a profitable investment which will repay many times its moderate initial cost. This unique bottomless bucket will in many cases, handle a load of up to 50% greater capacity than the regular bucket or clamshell.

On short range work, such as backfilling, grading and similar jobs where material must be moved but does not require lifting, the Crescent is simply cast from the boom tip like the regular bucket. The Crescent bites into the earth wherever it strikes and fills to capacity on the forward pull. The load literally floats along the ground to the discharge point and is deposited when the scraper is raised by the boom line.

When a job calls for digging from a river, deep pit or soft area beyond the reach of the boom, the Crescent Scraper is suspended by chains from a simple trolley that rides on a track cable extending from the boom tip to an anchorage. One drum of the machine raises and lowers this track cable, while the other drum operates the inhaul cable attached to the front of the scraper. Digging, hauling and discharge proceed as in the casting operation. Following discharge the empty scraper is lifted and gravity-returned to the excavation point by merely tightening the track cable.

Above: A 1½-cu. yd. Sauerman Crescent used with a 1-cu. yd. dragline is lifted clear of the levee and returns to the borrow pit by gravity at 1500 fpm.

Above: Boom machine has a boom length of 110 feet and uses a 4-cu. yd. Crescent scraper, replacing a 2½-cu. yd. dragline bucket.

Find out how other operators use Crescent Scrapers on their boom machines for greater economy, efficiency and flexibility. Write today for illustrated literature.

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NEW IDEAS

EXCAVATING UNDERWATER WITH TRACTOR

Cleaning under bridges, culverts, canals, with tractor-scraper. EFR 209

INCREASING DRAGLINE CAPACITY 50%

How to increase capacity of boom machines from 50 to 300%, and range up to 400 feet. EFR 219

RECLAIMING LAND WITHOUT DREDGES

Building up lake and sea shore property ready for landscaping at low cost without dredges. EFR 211

CLEANING PONDS AND RESERVOIRS

At long last—a simple, economical method of cleaning ponds without draining. EFR 213

CUTTING DOWN HIGH BANKS FROM TOP

High-production method for excavating steep faces with no danger from slides. EFR 202

TWO NEW METHODS OF STRIP MINING

Removing overburden and pulling back into long stable slope all in one cycle. EFR 210, 203

DIGGING GRAVEL 65 FEET UNDERWATER

Taking gravel from pit 65 feet below water level, moving 500 feet to processing plant. EFR 214

ROBOT RECLAIMS FROM STORAGE PILES

This machine picks up, transports, and dumps automatically, alone and untended. EFR 225

DIGGING HARD-PACKED MATERIAL

Taking tightly-consolidated rock and gravel out of pit 85 ft. below water. EFR 216

REVETTING BANKS FROM MIDSTREAM

Floating towers and dragline grade banks, construct levees at minimum cost. EFR 103

REQUEST BY NUMBER — SAUERMAN BROS., INC. 588 S. Clinton St., Chicago 7, Ill.

before depositing the fill, which was then built to a height sufficient to give adequate cover to the charges. Borings made through the fill after the charges had been blown showed that the peat is completely displaced.

"Where sand can be used as a filling and the charges can be placed by jetting, it is considered that this method would be suitable for depths of peat greater than 15 ft."

From WORLD CONSTRUCTION, *July-August, 1953.*

Standard plans for bridge superstructures

The U. S. Bureau of Public Roads has published "Standard Plans for Highway Bridge Superstructures," in which are presented standard plans providing complete details for various types of superstructures for highway bridges.

This publication is intended to serve as a useful guide to state, county, and local highway departments in developing designs for bridges of adequate strength and economical proportions on primary, secondary, and urban highways. The plans should be particularly valuable to the smaller highway departments with limited engineering staffs.

Included in the several series of drawings are detailed plans for I-beams, riveted deck plate girders, welded deck plate girders, reinforced concrete slabs, reinforced concrete T-beams, reinforced concrete box girders, post-tensioned precast reinforced concrete deck girders, and precast reinforced concrete deck girders. One series of I-beam spans involves 3-span continuous units. All other types of spans are simply supported. One series of simply supported I-beam spans is designed for composite action. The design of the reinforced concrete slab spans has been based on participating curbs.

Designs are included for two widths of roadway, 24 and 28. ft. The span lengths for the simply supported structures range from a minimum of 20 ft. to a maximum of 140 ft. The 3-span continuous units vary from 130 to 260 ft. in overall length, with the end spans having a length 80 per cent of the center span. The ranges in span lengths are based on the economy and suitability of the different types of superstructures. The live load capacity for all types of superstructures is H15-44 for 24-foot roadway widths and H20-S16-44 for 28-ft. roadway widths, with the exception of the precast reinforced concrete deck girder spans which are designed for a loading of H15-S12-44.

All of the designs are in accordance with the "Standard Specifications for Highway Bridges," adopted by the American Association of State Highway Officials in 1953.

Bituminous ROADS AND STREETS

Published by Gillette Publishing Company
33 West Maple Street, Chicago 10, Illinois

Cover Scene

Constructing penetration macadam lift for pavement overlay—Buffalo area, New York State Department of Public Works.

City of Maquoketa Paves 125 Blocks

H. G. Nevitt Discusses the Sand Equivalent Test

New Equipment and Materials

DECEMBER, 1953

HOLLOWS COST MONEY!

If you hold to within 5% of grade (that's less than ½ inch on a 9 inch thickness of material) you are putting almost 176 cu. yds. of extra material in every mile of road. You estimate what those 176 yds. cost you in your area . . . Hollows cost money!

The Adnun equipped with the Fluid Level will materially reduce waste in spreading stone and other base course materials and in laying asphalt base and surface.

With the Adnun Fluid Level you supplement the amazing accuracy of Adnun Continuous Course Correction with a gauge control so positive that you can take out the dips that won't show under the straight edge. Continuous Course Correction removes the short hollows and combines with the Fluid Level to give you results ordinarily associated with long wheelbase.

With the Adnun Fluid Level you have full control from subgrade to finished surface. With each course laid by the Adnun to an absolute plane and to accurate thickness *all the way* across the road and for every mile, better density and longer road life with less waste of materials is a sure result. With the Fluid Level you should beat that 5%.

Don't throw away material! Figure closer with the Adnun and the Fluid Level. If you haven't seen the booklet, "Put a Level on your Roads," ask for it.

* The Fluid Tells you it's Level. A turn of the hand adjustment wheel holds a positive grade. Every mile of road can be uniform as to thickness and density.

If you haven't seen the little booklet, "Put A Level On Your Roads," ask for it. It has some new thinking on road building.

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ADNUN TRADE MARK REGISTERED **BLACK TOP PAVER**

It's Paved with *Komac*®
the Year-Round patching and paving premix

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For Road Building or Resurfacing

TARMAC resists the stripping action of water . . . even withstands the softening effect of gasoline and oil drippings.

You can speed up construction work with TARMAC because it penetrates quickly, cuts through dust or moisture films readily, mixes easily with local aggregates and adheres firmly.

• Easy-to-apply KOMAC premix is the answer to your patching and resurfacing problems. Regardless of the weather—rain or shine, hot or cold—you just sweep out the hole and fill it with KOMAC premix. Compact it thoroughly, then open the road immediately to traffic.

One of the distinct advantages to remember about KOMAC is that it may be stored for a year or more without losing its easy workability. And it *pays* to stockpile KOMAC; as you know, road surfacing materials aren't always available in emergencies. But when you've got KOMAC on hand, you just shovel it into trucks and you're ready to go. It won't stick to shovels, truck beds, or spreading equipment.

Investigate KOMAC premix. Get your supply of it before the cold weather sets in, and you'll have it *when* you need it. For complete information, write today for our free booklet.

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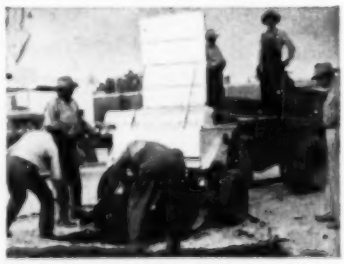
REMOVES BOTH MOISTURE AND SOLVENTS

MODEL HTD-500

Prepares Hot or Cold Bituminous Mixtures—¼ Ton Capacity

Designed for economy of operation in the production of bituminous paving mixtures, this new McConnaughay HTD-500 Mixer is large enough (¼ ton capacity) for many resurfacing jobs as well as all types of pavement patching. Working on location, it provides the exact amount of material needed; never too much or too little. It has a low pressure burner directed into the mixing and heating unit through a combustion chamber. This HTD-500 and all McConnaughay HTD models are *the only mixers which effectively remove both moisture and solvents from bituminous mixtures* . . . giving you positive assurance that patches and resurfaced areas will set up hard as soon as the applied mixture cools. Write, wire or 'phone for details and specifications today.



McConnaughay HTD-500 at work on street patching job in Cheyenne, Wyoming.

K. E. McCONNAUGHAY
LAFAYETTE 2, INDIANA

50 years without accident

★ A half-century of highway service without an accident is the unique record of foreman Robert J. Haar, who has just retired from the Pennsylvania department of highways. He began as a toll keeper for the old Susquehanna and York Turnpike Company, now part of the Lincoln Highway, and entered maintenance work when rock was still broken by hand methods

$300 million predicted for Illinois expressways

Three hundred million dollars will be expended for expressway construction in Illinois between now and 1961, according to a forecast made by Edwin A. Rosenstone, State director of public works.

The outlook for the next eight years was based in part on a progress report prepared by George L. Jackson, expressway engineer for the state highway department. It shows that $163 million dollars was spent for super-highways since 1946 in the Chicago area, including funds from all sources.

In Chicago and Cook County, expressway work is proceeding at the rate of $40 million dollars per year for right-of-way purchases and construction contract awards. A section of Congress Expressway to the west side will be open in the suburb of Maywood in 1954 and sections in Chicago ready in 1955 on this $150 million dollar project.

• The Lake Erie to Gulf of Mexico Turnpike Conference is being formed with headquarters at 705 Mercantile Library Building, Cincinnati, Ohio. William J. Reardon of Cincinnati is acting chairman.

The object is cooperation with all agencies in Ohio and through the southern states for completion of a North-South turnpike from Lake Erie to the Gulf of Mexico via Cincinnati. Mr. Reardon is a former member of the Ohio Turnpike Committee which wrote the present Ohio Turnpike Act.

• **Francis A. Canuso, Sr.,** head of the firm of Francis A. Canuso & Sons, large road and bridge contractors in the Philadelphia area, died recently at age 74.

How Advance Planning Helped Us Get Our Money's Worth in a

125-Block Paving Program

Foresight in having good engineering service and arranging for bond financing paid off for this small Iowa community which has just completed a $650,000 contract for a city-wide paving program.

By Orville E. Meyer
City Manager
City of Maquoketa, Iowa

THE present city administration of Maquoketa, Iowa, came into office April, 1951, after having been elected on a platform of improvement of municipal services and facilities. Early in their administration they were quick to realize that the cost of maintaining unimproved streets was expensive. The money spent for trying to maintain oiled streets, lacking drainage, was getting no one anywhere. For many years, streets were oiled periodically, usually at two-year intervals by special assessments. Almost every driveway had a culvert across the gutter, necessitating constant hand care and cleaning after every rain.

Early in the summer of 1951, the City Council went on record as being willing to sponsor a city-wide paving project. In the summer of 1952, work was really started. A survey of the entire city was made by the Council to designate and determine what streets should be improved. The project originally called for about 135 blocks, necessitating considerable storm sewer installation. Newspaper publicity was graciously furnished by our local papers. Naturally, we had an avalanche of protests and objections which could be anticipated from the city's past record in civic improvements. Except for a 12-block project in 1948, there had not been a major street improvement project in Maquoketa since 1911.

Our problem was one of publicity, education, and explanation of several types of street improvements. Again our local "Community Press" aided us in news stories and Council proceeding coverage.

Since the administration had definitely decided to go ahead, the next step was to provide the necessary engineering. After considering proposals, a contract was awarded to the Howard R. Green Co., of Cedar Rapids, Iowa.

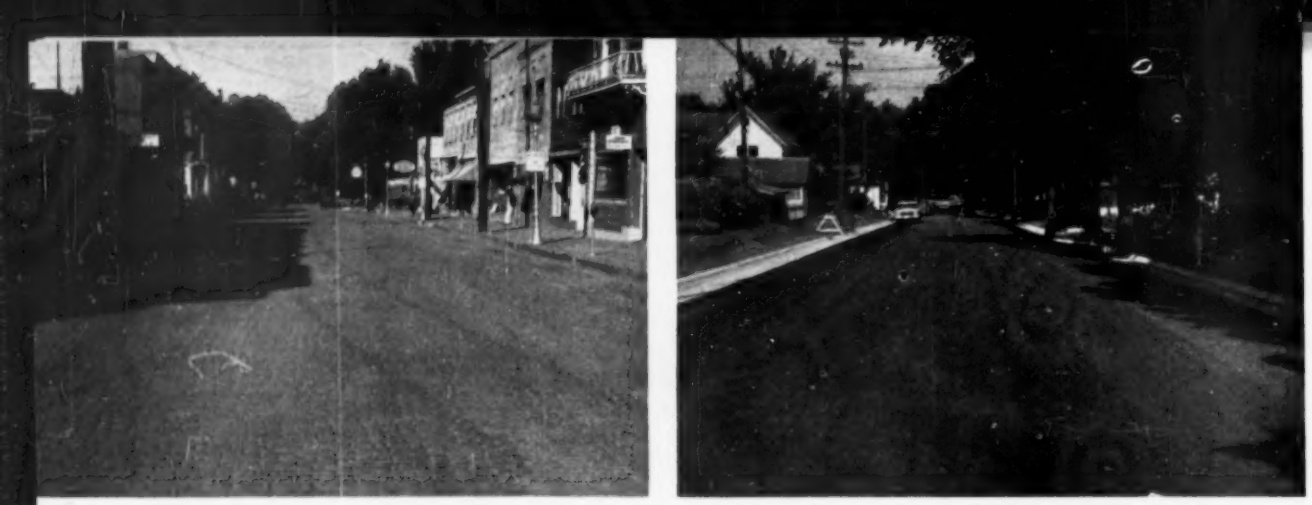
Upon recommendation of the writer, the City Council decided that we should arrange for proper financing of the project before it was started. Following reception of bond service proposals, an agreement was entered into with the Carleton D. Beh Co. of Des Moines, Iowa, for the furnishing of all necessary legal proceedings, bond attorney's validating opinion, and a definite commitment of the bonding company as to the price they would bid on both special assessment and general obligation bonds when such were offered for public sale.

Public Sentiment Aired

Late in the summer of 1952 we were ready to proceed with the necessary steps to put the project into being. "Resolution of necessity" was passed, the date set for the hearing publication, etc., were properly attended to. At our meeting set for the hearing of objections to the improvement, we were almost overwhelmed with the number and vociferous attitude of objectors. Objections ranged

★ Inspecting street work are Marvin Solem, grading superintendent; Paul Swardes, resident engineer; Orville E. Meyer, Maquoketa city manager

★ The existing crust of stony street material was first removed and spread on side streets not slated for immediate improvement



★ (Left): A typical old brick street of type resurfaced in the Maquoketa program. (Right): New street, consisting of 2 in. asphaltic concrete mat on 6 in. rolled stone base, flanked by 36 in. curb and gutter

from "now is not the time to pave; it should have been done thirty years ago when prices were cheap," to "too many people will be hurt." The entire range and scale of objections were raised. The City Council promptly overruled all objections and passed an amended resolution of necessity deleting enough blocks to bring the aggregate to about 125 blocks of improvements.

We proceeded with necessary steps and were ready to ask for bids and award a contract by January, 1953.

Our plans and specifications as well as notice to bidders called for alternate bids. Type 1 consisted of 6-in of rolled stone base with inverted penetration wearing surface in conjunction with 36-in. curb and gutter. Type 2 included 6-in. rolled stone base and a 2-in. asphaltic concrete mat with 36-in. curb and gutter. Type 3 included 6-in. concrete pavement with integral curb and gutter with an alternate bid for 7-in. concrete. There were several reasons for asking for such alternate bids, because included in the project were residential streets which did not, in the opinion of the Council, require a heavy-duty type of pavement. And, secondly, the use of such streets would not justify the additional cost to the assessed property. We insisted upon 36-in. curb and gutter for one specific reason. Here in Maquoketa, we use a power-driven street sweeper. We have found that with the additional gutter width the steel gutter broom never rides that section of the asphalt abutting the concrete gutter.

★ Preparing subgrade for construction of stone base

★ Thorough compaction of base course was obtained under rigid inspection and laboratory control

Our interested property owners were well informed as to the several types of pavement considered by representatives of paving materials.

On January 30, 1953, the Council ordered the construction and set March 2 for the receiving of bids and awarding contract. This delay worked to the benefit of the City, as had been anticipated. Contractors doing city and state work in Iowa had had a long construction season extending well into November of 1952. Consequently, the amount of work they had held over for 1953 was negligle. Sometime in January, 1953, the Iowa Highway Commission announced a definite curtailment of paving projects for 1953. Both these factors were in our favor.

On March 2, we received bids from eleven bidders, some of the largest and most reliable contractors in this section. A contract was awarded to Iowa Road Building Company of Fairmount, Minnesota, with Quad City Construction Company of Rock Island, Illinois, as sub-contractor. The asphaltic concrete construction or Type 2 was bid at 17.6% below the engineer's estimate and 7-in. concrete pavement 22.4% below the engineering estimate.

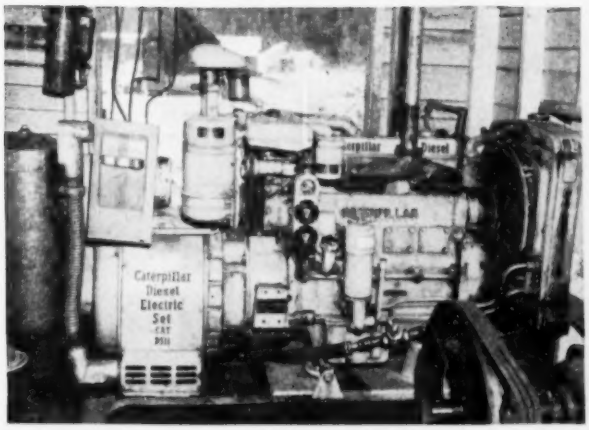
Four factors, I believe, were responsible for the low bids we received:

1. Our job was big, as City jobs usually are considered (contract signed was in excess of $630,000). It was large enough to attract the larger contractors.

2. Our timing, fortunately, was good. Contractors with little hold over work and not too much prospect of State or larger City jobs were "hungry" for contracts.

3. Financing for the project had

Why this remote camp takes trouble-free power for granted



Everything from food and clothing to lumber and Diesel fuel is flown into Camp 66. This is one of the line camps set up by C.M.M.K. to house workers on the 360-mile railroad construction job for Iron Ore Co. of Canada between Seven Islands, Quebec, and Knob Lake, Labrador. Power could be a problem here, but it isn't. A Cat* D311 Electric Set provides electricity for all lights and pumping the water supply.

There are many advantages in using Caterpillar Diesel Electric Sets in remote places. You can take their dependability for granted—it's engineered and built into every part for long life. They're rugged, too. They stand up under the buffeting of transportation. They're easy to install and operate. And they don't require costly, high-grade fuel. They burn low-cost No. 2 furnace oil without fouling. That means cheaper fuel and *less* of it to haul, as well as a minimum of maintenance!

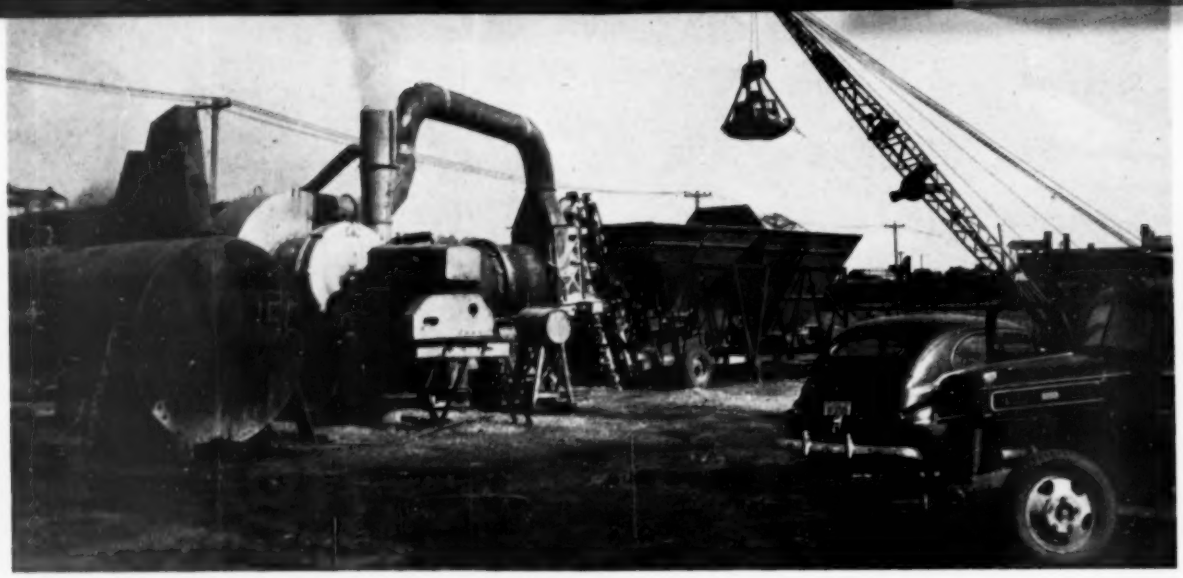
Are you figuring on electric power? You can save yourself trouble and money with Caterpillar Electric Sets. Engines and electric sets are available in 12 sizes up to 500 HP and 315 KW. Your Caterpillar Dealer backs them up with *fast* service. Call him today—ask him to *show* you proof of dependable performance!

Caterpillar Tractor Co., Peoria, Illinois.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—Ⓡ

WE'VE MADE CLAIMS... NOW MAKE US PROVE THEM



★ The asphalt plant of the Iowa Road Building Company of Fairmont, Minn.

been arranged through our Bond Service agreement.

4. Our engineering was in capable hands with a highly respected firm on the job.

On March 2, the date set for opening bids, we filed in the City offices a plea by the attorneys for objectors asking that the City be enjoined from negotiating a contract for the improvement. A date was set by the District Court for a hearing on the plea, but action was subsequently withdrawn before the hearing date. Construction started about the first week in April. As of Saturday, September 12, the engineers progress report showed that the project was 97.63% completed whereas only 54% of the time allowed for completion had elapsed.

Well Inspected Job

We have had excellent inspection on this project by the Engineering firm. Regular laboratory tests have been made of all types of materials used, including cylinders of concrete poured which were sent to inspection laboratories. A small trailer serves as a laboratory near the asphalt mixing plant, equipped to make aggregate gradation tests of all stone used in both the base and asphaltic concrete mat, also extraction tests to determine the percentage of asphalt in the mix. Samples of the mat were cut from streets after laying to determine compaction. In all cases, tests were well above specification standards.

The 18,000 cu. yd. of excavation required was used to fill properties affected by the paving, and in all cases no fill was furnished to anyone except by a written order from the writer. Such orders after being filled were returned to this office for confirmation. We have had very few complaints as to the equitable disposition of excess fill. Less desirable fill material was used to fill ravines on the city outskirts.

Since our streets have been oiled at intervals over a period of time, most streets on the project were covered with a layer of road oil, gravel, sand or rock chips to the depth of about three inches. The first step in excavation was to remove this layer which in turn was hauled onto some unimproved streets. We then bladed and rolled this material into place, to the end that we have built an excellent base and surface on the previous unimproved streets. It is surprising how well the material knitted back together and presents a smooth and almost dust-free traveling surface. On the entire project, we have not had any overhaul charge. We have attempted to use material as close to the scene of excavations as possible.

Two alterations were made from original specifications. With consent of the contractor, base rock was laid in two lifts instead of one to permit greater compaction. The original specifications called for curb and gutter to alley return, with curb around the radius; we decided to run our gutter through the return and pour the balance of the return with concrete, thereby eliminating a troublesome problem of processing the base and mat around these curved returns. This also tends to give better drainage through this area, thereby avoiding possible deterioration of the surface at a later time.

Residents Cooperate

As a general rule we have had better than average cooperation from motorists and residents. There have been cases of broken barricades and violation of restricted areas, but in no instance have any arrests been made. Our contractors and their employees have been both courteous and cooperative, and every effort has been made to keep traffic near its normal course. Naturally, there have been instances, but few, when traffic has been seriously hampered, and most of these because of bad weather conditions at inopportune times.

Since this City operates both the water and light services, our problem of "keeping ahead" of the contractors in moving poles and raising or lowering water cut off boxes and valves was a large one. Here also our streets and sewer departments were kept busy locating sewer manholes and storm sewer inlets. All of these departments worked well in cooperation with our contractors. Each contractor was furnished charts of any such items that needed attention during the progress of his work. We notified all interested property owners of sewer and water connections needed to be replaced or installed before the paving actually began. Our local plumbers, although extremely busy, cooperated well. In some cases, in order to expedite backfilling and tamping of ditches, city crews helped in such work and the office subsequently billed individuals for the service.

Property Owners' Convenience

We have kept on file in the office a copy of the preliminary plat and schedule. Each office employee has been instructed in their use, so that any interested property owner could, at any time, be informed as to the amount of his proposed assessment. We solicited inquiries and tried to explain as to the "why and wherefore" of proposed assessments. I believe that every effort has been made to educate and inform the people on this project.

On several occasions our local newspaper carried informative stories about the project. Questions heard or voiced were referred to the writer, answers were printed in the newspaper, after Council approval, about all phases of the project.

Our entire project was due to be completed by October 15. We expect to be able to have our final assessment roll ready by December 1, at which time payments for the paving can be made in full, or set up for annual payments extending over a 10-year period. We also expect to be able to announce reduced assessments

on all properties ranging from 12% to 15% on asphaltic pavement and 18% to 20% on concrete below our preliminary plat and schedule amounts.

Dollar-wise and quality-wise, I do not believe this project has ever been equalled.

On September 14, we advertised and sold $150,000 of G. O. bonds to cover engineering costs and a portion of the construction costs to be paid by the City. This was done in order to save the 5% interest due on the contracts after completion date. The monies so derived upon delivery of the bonds will be deposited in a special "Streets Improvement Fund" and disbursed upon approval by the Council at the proper time. Our bond service agreement called for a firm bid of par and accrued interest on 2½% interest bearing bonds. At public sale these bonds were sold for par and accrued interest, premium of $160 for 2¼% interest bearing bonds. Maturity dates are over a 10-year period. This, I believe, is the best argument for a previously arranged financing program.

The rest of our G. O. Bonds necessary to issue will be sold at a later date after final determination of the amount. Incidentally, the commitment for our Special Assessment bonds calls for 3¾% interest. In view of the present bond market conditions, I think we have done well and certainly have justified our bond agreements. Imagine the savings to the City in this low interest rates. The advantage of such prior financing is also reflected in the bids of the contractors, who knew that they could arrange for payments against engineer's estimates through the bonding companies or banks.

State Joins in Program

On the basis of our low bid for asphaltic concrete, the State of Iowa has decided to participate in our program to the extent that they are resurfacing some 20 blocks of State highways through the City. The City administration in turn has decided to resurface the only three additional blocks of old pavement in the City.

We shall present an entirely new look to visitors of this growing City. Property owners have been busy placing new walks, grading and seeding parkings in front of their residences, painting their homes, improving their driveways. Many obstinate objectors to the project now are sincerely proud of their achievement.

Until this project started, Maquoketa had few paved or improved streets—probably the smallest percentage in proportion to population of any City in the State. Today, we have entirely reversed this position and now present an entirely new appearance—clean, modern and progressive, progressive in City planning and Community thinking. Personally I am happy to have played a small part in this change.

VIEWS AND COMMENTS

By H. G. Nevitt

The Sand Equivalent Test

Everyone concerned with almost any phase of highway construction should read the paper presented at the Highway Research Board in January of 1953 by F. N. Hveem of California on his sand equivalent test.

We have but minor comment on the test technique. It is claimed to be reasonably accurate, brief, and suited to field conditions. Undoubtedly it is susceptible of refinement by its author and others after some continued use. We leave this and other discussion of the procedure details to laboratory technicians and others more competent to do so. Our primary concern is in the principles behind the test, as brought out in the discussion by Mr. Hveem.

The first of these is that the characteristics of aggregate mixes, whether cemented by bitumen or by other binding agents, are essentially determined by the volume proportions rather than weight. This simple and obvious principle is frequently lost sight of in the routine of actual construction. For example, we have seen a number of jobs in which an insufficient amount of binder was incorporated simply because the bituminous material happened to have a high specific gravity; the use of a normal weight percentage resulted in a lack of sufficient binding material. This will not happen if the amount of binder is held at the upper level of the permissible tolerance; but a number of states have the contrary practice of holding it at the lower end of the tolerance, and a slight deficiency in volume due to higher specific gravity in the binder may therefore bring it over into the lean classification with resulting grief and expense.

It has long been our feeling that all proportions should be specified on a volume basis, with the translation to weight given in the field for practical construction, but so handled that it is obviously a matter of adjustment to the actual materials in the job.

The second principle, equally neglected but not as well appreciated, is that the volume of the material, more particularly of the fine fractions of the aggregate, which must be considered, is that existing after equilibrium with moisture has been reached. This has, of course, immediate application to base course design in which the binding material usually contains some fractions which will be readily water absorptive, but it likewise has bearing on some bituminous mixes. If similar fractions are present in these bituminous mixes, even though in small proportion, they will ultimately take up the equilibrium water, and perhaps consequently give an excessive binder or fines volume with resultant distress. The proposed test seems a simple way of insuring that the final proportions in the mix after equilibrium with moisture has been reached will not be unsatisfactory.

The test has some theoretical failings. For example, it does not adjust for the varying specific gravity of the fractions tested, which will of course affect their settlement time. However this criticism may have little significance in practice, and if so can be taken care of without real difficulty. The method provides a control in an area hitherto left either to chance or only indirectly provided for. As such it is a real contribution, as is the discussion of the principles involved in it. This paper is a "must" for those in any branch of road construction who wish to understand the fundamentals of the subject.

• The Commerce Department says that passenger cars are now being operated at an average speed of 42 miles an hour on main rural highways in the United States, with about 12 per cent exceeding 60 miles an hour and an occasional vehicle traveling more than 80.

WHAT'S NEW
in EQUIPMENT and MATERIALS

Hough Tractor-Shovel Has Torque Converter

Performance of the Hough Model HM tractor-shovel has been considerably improved by the addition of a hydraulic torque converter according to officials of The Frank G. Hough Co., 768 Seventh St., Libertyville, Ill. This improvement is incorporated in the gas and diesel engine

Hough "Payloader" Tractor-Shovel

models as well as in the TM tractor, developed for heavy duty switching and towing operations. This converter is a 3-element-type which multiplies the torque output of the engine in direct proportion to the load requirements. In conjunction with the four-speed, full reversing transmission, it provides a much smoother tractor-shovel drive than has previously been available. The torque-converter, by greatly reducing the amount of "clutching" and gear-shifting needed, also materially reduces the amount of effort and concentration previously required of the driver. This drive acts as a cushion for the entire power train, thus protecting these components against load shocks, reducing maintenance and prolonging the lift of the unit.

New 10-Ton Truck Highly Maneuverable

A new 10-ton heavy duty truck, Model 10-S, has been added to the line of Dart Truck Co., Dept. R-S, 2623 Oak St., Kansas City, Mo. Utilizing many of the design

Dart Model 10-S Truck

features which are found on many of its larger trucks, Dart has built the new 10-tonner with unusually rugged features. It uses the box section frame, the same type which is used on Dart's large ore-hauling trucks. Its forward one-man cab provides more driver visibility. Maneuverability in close quarters has been provided by designing the truck on a 100-inch wheel base. It is stated to turn in a radius of less than 20 feet. To assure high speed with full load, the Dart 10-S is powered with a 6-cylinder Continental Rd6572, 156 HP diesel engine. Six tires, sizes (12:00 x 20) are the same for making switching possible. They are rock lug type, 16 ply. The hoist is a twin-6 in. diameter, double-acting, single-stage hoist which raises to a 60° dumping angle. It is stated to dump in 10 seconds. An additional feature of the truck is its front end suspension. The front springs are extra long providing easy riding. Two-stage springs are provided in the rear.

"All-Position" Rear Blade

A sturdy new suspension arrangement developed by Shawnee Manufacturing Co., 1947 North Topeka St., Topeka, Kan., enables the driver of lightweight tractors to

Model 200 Shawnee Rear Blade

switch the position of the rear blade without leaving the driver's seat. With either side of the tractor with the blade angling the blade can be extended to either side of the tractor with the blade angle whether right or left. By manually positioning the blade, it can be extended 3 ft. beyond the wheels on either side of the tractor. The blade is instantly reversible for back blading. Another adjustment made manually enables the blade to be tilted permitting the unit to dig "V" drainage ditches and other similar work with maximum efficiency.

Four New Models "Quick-Way" Truck Shovels

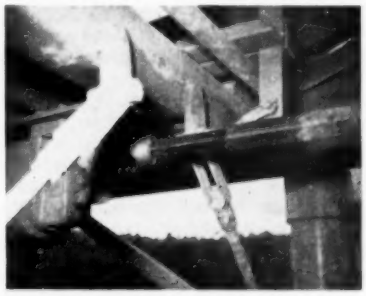
A complete new line of truck shovels has been announced by "Quick-Way" Truck Shovel Co., 2401 East 40th St., Denver, Colo. The four models are: L-2, ½ yd. 10

New "Quick-Way" Model L-2

ton crane; E-2, 4/10 yd. 7½ ton crane; S-2, ½ yd. 5 ton crane; and J-2, ¾ yd., 3½ ton crane. The new models embody many new engineering features and have the "Quick-Way" simplicity of design, interchangeability of parts and rugged all steel construction. The models stress convertibility with five booms: crane, shovel, trench hoe, front dump shovel, and scoop. With these booms the "Quick-Way" special attachments, such as the new hammer drive clam, dragline, clamshell, magnet, pile driver, hay fork, log grapple, back filler blade, telescoping boom and skull cracker, put operators in a position to handle numerous jobs. New features include: clutches of "roll in" self-energizing reversible shoe type. New brakes feature increased leverage, large brake pedals and automotive brake pedal action. New heat treated center pin thrust washers encased in oil tight pan. Conical, high alloy steel swing roller and roller pin in diameter have been increased. The new design, oil tight pans which encase all engine, Jack shaft and main hoist drive are an important new feature. A complete new control cabinet features independent, self-filling hydraulic cylinders on each contive line. New features of the Models L-2 and E-2 include an all-steel, full vision cab with safety glass with 360° vision, more room, greater comfort and controlled ventilation.

Power Take-Off Drive for Tractor-Trailers

A new tractor-trailer power take-off drive developed by Stow Manufacturing Co., 445 State St., Binghamton, N. Y., consists of a 1¼ in. flexible shaft in combination with a square telescopic bar and tube. The flexible shaft provides a powerful, quiet, flexible drive, which requires little maintenance. It is very simple to install and eliminates expensive and delicate power couplers. Also, since the flexible shaft absorbs shock loads, the pump life is increased a great deal. The telescopic rod not only acts as a simple, fool-proof quick-



The Universal Joint and Telescopic Rod Shown at Close Range

disconnect coupling, but it also takes care of the change in length when the tractor-trailer is jackknifed. An 1800 in. pound universal joint is used between the pump and the telescopic rod, so that the flexible shaft will not have to be bent so severely.

Rotary Snow Plow Mounts on Tractor

A new Series "A" Sno-Flyr rotary snow plow, placed on the market by Wm. Bros Boiler and Mfg. Co., 1057 10th Ave., S.E., Minneapolis 14, Minn., mounts on the front-

Series "A" Sno-Flyr

end hydraulic loader of the industrial wheel-type tractor. It utilizes the same pins and connections used to attach the loader bucket. No extra braces or drilling are required. Snow removal capacity is stated to be 3 to 4 tons per minute in average snow conditions. Bucket tilting device provides positive operating control on plow and engine at different elevations. In this way, the unit can be raised to the top of high drifts, to chew them down, layer by layer. A special loading chute allows truck loading on either side of plow. Its rotating feature permits "spot" casting of snow in confined areas. Casting chute can be rotated through arc of 180 degrees. A special capping device can be added to control height of ejected snow stream.

Noiseless Exhaust System for Trucks

After two years of intensive engineering research the GMC Truck and Coach Division of General Motors Corporation, Pontiac, Mich., has developed an exhaust system for its GMC trucks that renders exhaust noises inoffensive to the human ear. GMC Truck models with the newly-designed mufflers and exhaust pipes are now in production. A special name, "Silent Power," was originated for the system to indicate not only that GMC has eliminated objectionable exhaust noises but has not had to decrease its engine power to achieve it. The mufflers are a reverse-flow type, larger than previous units and made more rigid by the use of heavier gauges of metal. New exhaust manifolding and larger exhaust pipes are incorporated in the system.

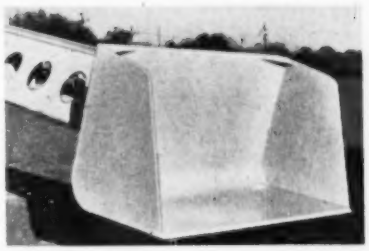
Throttle Control for Gas or Diesel Powered Equipment

A new positive-action, friction-type throttle control designed to improve the performance of gasoline or diesel-powered equipment has been announced by the Link-Belt Speeder Corporation, Cedar Rapids, Ia. This new throttle control, which provides an infinite range of engine speeds, can be used on shovels and all other construction machinery, industrial and farm tractors, marine engines, crushers and drilling rigs, and similar equipment. The throttle control, once set, holds the engine speed constant despite vibrations which might be encountered. The control is easily mounted in the field, and no adjustment is necessary to compensate for engine size or type. Increase or decrease of engine speed with this new throttle control is fast and positive, and requires little effort. The control will stay put in any position, with any governor pull up to 75 lbs. The elimination of ratchets and pawls, plus a negligible number of moving parts, keeps wear to an absolute minimum. Moving parts on the new control are either aluminum or cadmium plated to resist rust. The throttle control mounts any place a governor cable can be attached. Installations on old and new equipment of all types and manufacture are being made by the distributors of Link-Belt Speeder power cranes and shovels.

Link-Belt Speeder Throttle Control

Snow Bucket for Gradall

A new snow removal bucket, available as a standard Gradall accessory, has been announced by The Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, O. The new bucket is 60 in. wide, 32¼ in. deep and weighs 585-lbs. It is designed to prove particularly advantageous in ice and snow removal work in metropolitan areas. Straight sides of the bucket facilitates snow disposal; and because the Gradall boom rotates 360 degrees, snow can be dispersed readily within a 24-ft. radius.



Snow Bucket Developed by Gradall

Resurfacing A Major Highway without closing it to traffic

with the H & B MOTO-PAVER

While designed primarily for resurfacing work on secondary roads and city streets, the *Moto-Paver* here demonstrates its efficiency in resurfacing a major highway. Traffic was maintained on this highway—one of the busiest in the East—while the work was being done. The lower picture shows aggregate being dumped into the Moto-Paver hopper on the job.

The Moto-Paver does the complete mixing and laying job—in one continuous operation, using beach sand, gravel, crushed stone or slag aggregates, and tars, cutback asphalts, road oils, emulsions or other bituminous materials. Road speeds up to 25 mph make possible quick moves from job to job. For specifications and complete information see your local H & B distributor or write for Bulletin MP-43.

HETHERINGTON & BERNER INC. • *Engineers—Manufacturers*

721 Kentucky Avenue — Indianapolis 7, Indiana

TRULY BALANCED PLANTS OF 2000 TO 6000 LB. MIXER CAP.

- McCarter . . . backed by 20 years experience . . . designs and manufactures this equipment in their own works, assuring standardized parts and minimum costs.
- McCarter standard plants are readily adaptable to your special requirements. Individual units are also available.

DRYERS (Hot or hot and cold material, center outlet type)

MIXERS, ASPHALT BUCKETS (Steam, hot oil or electric heated)

AGGREGATE HOPPERS, BINS, APRON TYPE FEEDERS, CYCLONE COLLECTORS, ELEVATORS, STEEL STRUCTURES

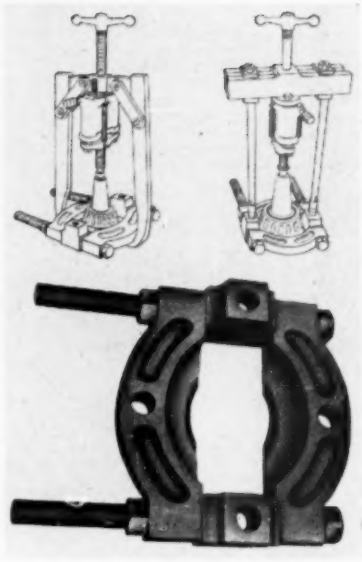
REPAIRS AND MODERNIZING
We specialize in remodeling old plants for better production and more efficient operation.

CALL FOR ONE OF OUR ENGINEERS TO GO OVER YOUR PROBLEMS WITH YOU

Mc CARTER IRON WORKS, INC.
NORRISTOWN, PENNSYLVANIA

New Pulling Attachments

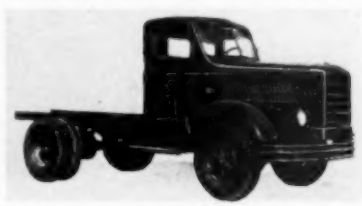
Two new, large size pulling attachments for use with standard pullers have been introduced by the Owatonna Tool Co., 417 No. Cedar St., Owatonna, Minn. Used with their 50 ton Power Twin hydraulic ram in connection with either Grip-o-matic pullers these attachments facilitate the removal and installation of large bearings, gears, pulleys, sheaves, wheels, couplings, etc. on all types of machinery. One size has a capacity from 5¾ in. to 13 in. while the largest size has a capacity from 6¾ in. to 16 in. The pulling tees into which push-puller legs are threaded are stated to more evenly distribute the load when extreme pressure is used.



New OTC Pulling Attachment

New Line of Heavy-Duty Trucks

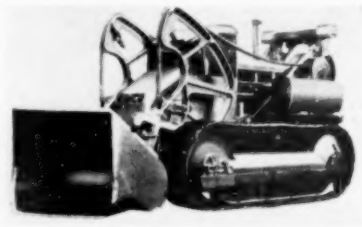
A complete new line of heavy-duty trucks has been announced by The Four Wheel Drive Auto Co., Clintonville, Wis., Math-Matic design is the outstanding feature of the new four and six-wheel drive trucks. Under development for many years, Math-Matic Design is stated to produce a mathematically correct proportioning of truck weight and power between front and rear wheels. This is stated to result in 30 to 37% more tire life and 40 to 82% more tractive ability. Among 15 other major new features are rigi-tapered frame with deep taper design which rigidizes the front end for mounting equipment and distributes load over the entire frame; a new, larger, full-floating rear axle said to be 30% stronger; trunion-mounted radiator, isolated from frame by rubber; rubber-cushioned engine mountings; valve-in head engines, light weight with high power output; diesel engines available for all models; 12-Volt electric system; hevi-duty steering gear with power steering, optional; stirrup-action clutch and brakes with clutch hydraulically assisted and brakes power assisted.



Truck Representative of FWD's New Line

Tractor-Loader Has New Features

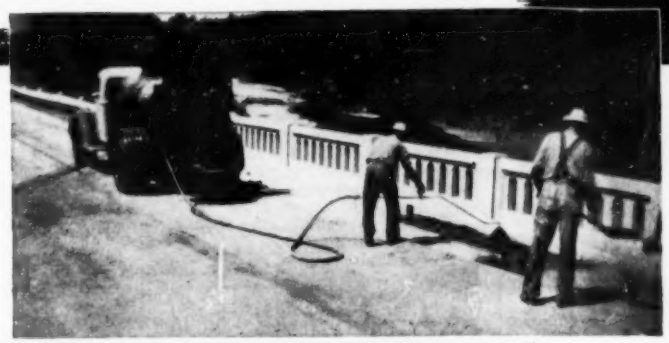
The Eimco 105, basically a new heavy prime mover available with its own excavating attachment and other tools, has been announced by The Eimco Corporation, P. O. Box 300, Salt Lake City, Utah. The 105 is considerably heavier than their previous large model (weighs approximately 34,000 lb. complete with loader) and has numerous design and operating improvements many of which are claimed to be exclusive in this type equipment. The most important of these is Eimco's new unidrive transmission, containing, in one compact unit, all of the gearing and clutches for speed changing and full independent reversal of each track. The design is stated to combine all of the best features of torque converter, constant mesh gearing and hydraulically actuated friction clutches with sealed oil bath, pressure lubrication of all wearing parts. The oil cooled, positive engagement clutches are stated to never need adjustment. The precision helical gearing is alloy steel, carefully heat-treated and micro-shaved. One important feature made possible by the new transmission is the independent control of each track. The ability to run one track forward and the other reverse provides extreme maneuverability. All gearing, sprockets, front idlers

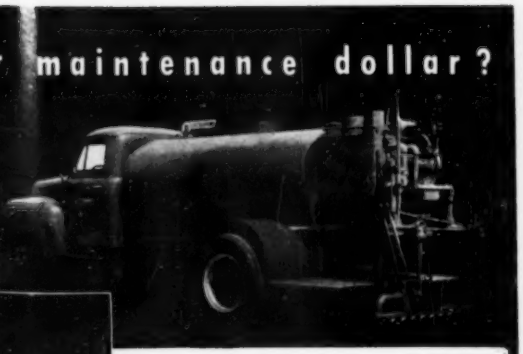


The Eimco 105 Tractor-Loader

Want to S-T-R-E-T-C-H your maintenance dollar?

101
UTILITY SPRAY TANK





You'll need a 101 Utility Spray Tank to do it! Because here's a combination of 3 Units all done up in one package. The Model 101 is designed to give Highway Departments and Contractors a Utility unit that will do a variety of road maintenance jobs economically. The 101 Utility Spray Tank has a Spray Bar for small application work, Hand Spray Attachment for patch work and Pouring Pot Outlet for crack filling work. This 101 Utility unit will handle Asphalt, Tar Emulsion, Road Oil and Cut-Back. Has a fast heating system with Vaporizing Torch Type Burners. The 101 is made in both Truck Mounted and Trailer Mounted Models, sizes ranging from 400 to 1000 gallons. If you want your maintenance dollar to stretch here's the unit for the job. For further details write for Bulletin No. 5.

BLACK TOP ROAD MAINTENANCE EQUIPMENT
LB
SINCE - 1900

LITTLEFORD

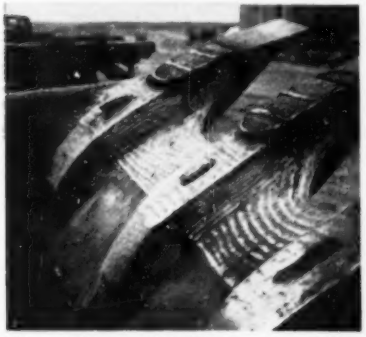
LITTLEFORD BROS., INC.
454 E. Pearl St. • Cincinnati 2, Ohio

and many other parts are cast alloy steel with liquid flame hardening. Controls are simple. All movements of the tractor are with two small conveniently located handles immediately in front of the operator. There are two final drivers, one for each track. Many other new features of tractor design are incorporated in the 105. The operator sits well up front for best visibility of work in loading and bulldozing. The power unit faces the rear and is located at the center of the machine. Units now in production use a 90 HP diesel engine with matched troque converter.

Hard-Facing Electrode for Construction Equipment

A new electrode particularly suited for hard-facing heavy construction equipment such as crushers, bucket teeth and lips and ripper teeth has been introduced by the Stoody Co., Whittier, Calif. Performance records of this alloy, Coated Tube Stoodite, show remarkable effectiveness, economy, and durability in service.

Under extensive field tests conducted through a period of nearly two years, Coated Tube Stoodite has been subjected to every possible use in order to determine its suitability for equipment of all kinds. A great many users of hardfacing alloys have assisted in these tests and will recognize the product as "Experimental Electrode, Stoody 1293." The deposition rate is said to be so fast as to surprise experienced welders who have not previously observed it. The welded deposit is smooth, sound and free of pinholes or checks. With chromium and molydenum as the principal alloys this material provides especially good resistance to all types of abrasion, exhibits high compressive strength and has excellent impact resistance. Coated Tube Stoodite is readily weldable to all carbon and alloy steels including manganese. Deposits are semi-austenitic, and are not affected by ordinary heat-treat methods. Under normal welding procedure, either AC or DC, deposits show a Rockwell C hardness of 56-60; properties are retained at temperatures up to 800° F.



Where Wear Is Most Severe, as on Heavy Buckets, Coated Tube Stoodite Has Proven Most Effective

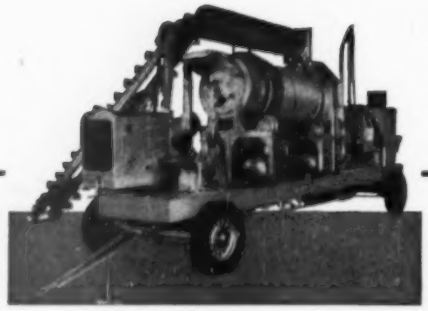
O'HADI ROAD & STREET PATCHER

An all weather Patcher.
Fast, economical,
permanent

Simply place it over the cleaned hole. Fill the hopper with mix.

The O'HADI PATCHER heats the hole and the mix at the same time.
Satisfaction guaranteed. Sold on 30 days trial.
No Road or Street Department can afford to be without O'HADI PATCHERS.

BUHL MACHINE Wks. Buhl, Idaho



Portable Asphalt Plants For City, State, Repairs and Small Contract Work

These 8-10 tons per hour Asphalt Plants economically repair almost any pavement. Asphalt, brick, concrete, macadam, can be resurfaced or patched. Alleys, driveways, sidewalks, industrial plants can be paved.

Produce for immediate hot laying, or for deferred cold patching. Match any bituminous surface.

Mixes at plant, including labor, fuel, and overhead, cost about $4 per ton, with $2 aggregate. Average 160 to 200 sq. yds. 1" thick per hour. A money-maker for small contract work.

Also larger plants, 15 and 30 tons per hour.

Write for catalog and name of nearest dealer

ELkhart 20 White Mfg. Co. Indiana

Oil Resistant Driveway Sealer

A new product, Ortar Emulsion-Type D.S., placed on the market by The Flint-kote Co., Industrial Products Division, 30 Rockefeller Plaza, New York 20, N. Y., is claimed to be especially suited for use over asphalt pavements which are exposed to the deteriorating and softening effects of car drippings, gasoline, grease and many other chemicals. It likewise seals the surface against water infiltration and retards rapid oxidation of asphalt caused by the actinic rays of the sun. The emulsion is made from selected coal tar pitch dispersed in water by means of a mineral colloid (a form of clay). As the water evaporates after spreading in a thin film, the fine particles of tar pitch coalesce to form a tough, elastic, continuous membrane. This sealer neither softens nor flows at high temperature; it does not crack at low temperature. It forms excellent bond to clean surfaces.

Hopper Conveyor for Backfilling

A new hopper conveyor for filling trenches, ditches, pipe lines, etc., has been announced by Power-Pack Conveyor Co., 13910 Aspinwall Ave., Cleveland 10, O. The Model 600 is powered by an 8 HP gasoline engine which drives the 14 in. wide conveyor belt. Controls are located at the operator's platform for easy adjustment of belt speed, amount of material fed through the bottom openings of the hopper, and placement of the fill material. Maximum capacity is stated to be 3 tons per minute and maximum belt speed is 500 ft. per minute. The hopper conveyor is towed by the truck as it dumps its load into the hopper feeding the belt. An adjustable deflector permits the operator to place the material without waste or spillage. Speed of the towing truck and conveyor belt, and amount of material being carried by the belt controls the rate of fill delivered. The Model 600 will handle practically any fill material from sand, cinders, and crushed stone to heavy clay.

Model 600 Hopper Conveyor

Traction Lugs for Wheel-Type Tractors

Traction lugs for wheel-type tractors, claimed to provide up to 160% increased drawbar pulling power, are now in production by Baraboo Manufacturing Corporation, Baraboo, Wis. The lugs are cast of a special alloy for extra strength. They are fastened to the rear wheels. Each lug extends out to 3½ in. beyond the tractor tire, yet there is no rubbing or wearing on the tire itself. The tire provides flotation over soft ground with some traction from the tread, while the lugs provide geared-to-the-ground-gripping power for forward pull. The lugs become a permanent part of the wheel when attached. To use these lugs, just snap them open, a strong steel spring and automatic lock holds lugs in position. When through, just snap them shut to the center of the wheel, in less than a minute, and you're ready for normal tractor use.

Miracle Tractor Lugs

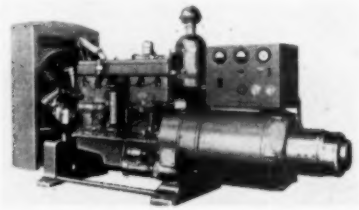
Alumetallic Clutches for Draglines and Shovels

Contractors and operators know that under certain digging conditions in dragline or shovel work, the swing clutches develop a high degree of heat from excessive slippage. To overcome this trouble on the swing clutches when operating under these conditions, alumetallic clutches are now being offered by Unit Crane & Shovel Corp., 6411 West Burnham St., Milwaukee 14, Wis. The clutch parts are constructed of high tensile aluminum which dissipates the heat more rapidly. As illustrated the front, center, back, and lining plates are all aluminum alloy and are faced with bi-metallic linings which are matched making a lining-to-lining frictional contact. The alumetallic clutches are considerably lighter in weight than the standard clutches, and this reduced weight works less hardships on the bearings and also cuts down the momentum when the swing cycle is reversed. These clutches are available as optional equipment on Unit 1020 and 1020A shovels or draglines.

Alumetallic Clutch Plates

New 50,000 Watt Electric Plant

A new 50 KW., 62.5 KVA., electric plant, model 50 KA., announced by D. W. Onan & Sons, Inc., Minneapolis 5, Minn., is designed for any type of job requiring heavy duty primary or emergency standby power. It will deliver a full rated 50,000 watts at 80% power factor with ample overload capacity. Powered by an International Harvester gasoline engine, the new generating plant is claimed to have many important features. The engine delivers 104 HP. at 1,800 RPM. and has a 450 cu. in. piston displacement. It is equipped with replaceable cylinder liners, roto exhaust valves, oil bath air-cleaner and a remote, 12-volt starting system. Water-cooling, full-pressure oil lubrication with a sump capacity of 9 qts. and a low oil pressure cut-off to protect the engine are other features offered in this rugged, heavy-duty engine. The Onan-built generator is of drip-proof design, direct connected to the engine for permanent self-alignment. It has excellent motor starting characteristics, with ample overload capacity. Voltage regulation is plus or minus two per cent. An improved brush rig design features constant-pressure brush springs.



Model 50 KVA Onan Electric Plant

KLING XX CONCENTRATE FOR BITUMINOUS PATCHING

THE FALL PATCHING SEASON APPROACHES. BE PREPARED TO MAKE HIGH TYPE PATCH MATERIAL BY USING KLING XX CONCENTRATE, THE MOST EFFICIENT AND LEAST COSTLY ADDITIVE FOR BITUMINOUS MATERIALS. AT LOWEST COST PER TON OF MIX.

★ ★ ★ ★ ★ ★

TO YOU PRODUCERS OF PLANT-MIX STOCKPILING MATERIALS:

KLING XX CONCENTRATE (1) gives you a complete coating; (2) allows stockpiling without stripping; (3) increases workability permitting loading at below freezing temperatures; (4) allows stockpiles made in the Fall to be available in the Spring before your plant opens up—and, most important, lets you produce a patching material which stays put—even in wet potholes.

You may stockpile yourself or let your State, County, City or railroad customers do it in their own yards.

TO YOU ENGINEERS AND FOREMEN MAKING YOUR OWN PATCHING MATERIALS:

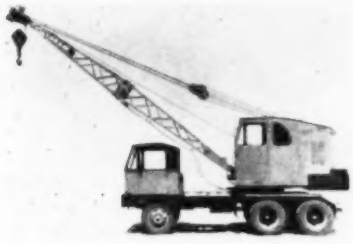
KLING XX CONCENTRATE (1) permits coating of cold, wet aggregates when using liquid bituminous materials; (2) allows no stripping; (3) makes penetration-type patching possible in wet weather and—as with the plant-mix type—the patch material really bonds to a wet base.

KLING XX GOES TWICE AS FAR! ! REMEMBER, IT IS A DOUBLE STRENGTH ADDITIVE FOR ASPHALT OR TAR AND YOUR COSTS ARE ONLY A FEW CENTS A TON.

WRITE US TODAY. WE HAVE THE ANSWER TO YOUR PATCHING DIFFICULTIES.

LANCASTER CHEMICAL CORPORATION

9 ROCKEFELLER PLAZA **NEW YORK 20, N. Y.**



Model MC-254W Moto-Crane

New Models Lorain Moto-Cranes

Two new additions to its line of Lorain Moto-Cranes have been announced by The Thew Shovel Co., Lorain, O. They are model MC-254W in the "TL" Series, with a lifting capacity of 17½ tons, and model MC-424 whose lifting capacity is 22½ tons. Model MC-254W is a 3-axle Moto-Crane available as a ¾ yd. shovel, crane, dragline, clamshell, hoe or 1¼ cu. yd. scoop shovel. Overall width is 106 in., giving additional lifting capacity "on rubber," without setting outriggers, while maximum boom length with tip extension is 95 ft. It is equipped with 8 forward speeds, 2 reverse speeds and air brakes. It can travel up to 37 M.P.H. The new Lorain may be had with diesel or gasoline power for turntable and carrier, with front driving axle, third drum and other accessories. The 22½ ton model MC-424 is a two-engine machine with a gasoline-powered turntable or superstructure mounted on a 3-axle carrier, with drive on the two rear axles, powered by a separate gasoline engine at 10 forward speeds (up to 27 M.P.H.) and 2 reverse speeds. The carrier has an over-all width of 96 in. and is equipped with air brakes. The maximum boom length with tip extension is 125 ft. and it may be equipped with diesel power for turntable, third drum, power load lowering, front wheel brakes and many other accessories. The MC-424 is convertible to shovel, crane, clamshell, dragline or hoe booms.

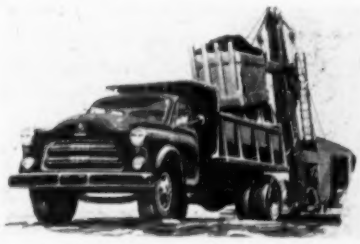
Converter Units for 2-Way Radios

To prevent the obsolescence of 6-volt mobile two-way radio units by the trend toward 12-volt automotive electrical systems, Motorola Inc., 4545 W. Augusta Blvd., Chicago, Ill., has designed two small, highly efficient 12-volt to 6-volt converter units. One converter is capable of supplying from 10 to 59 amperes, the other from 10 to 30 amperes. Both units, utilizing a special transformer-vibrator circuit, have conversion efficiencies of better than 80 per cent. Long life and high reliability are assured through the use of a heavy duty, 16-contact vibrator. The small, compact units may be conveniently mounted either in the automobile trunk or under the instrument panel. Overall dimensions are 7 in. by 9¼ in. by 6⅝ in. The use of these converters is stated to be especially advantageous to operators of fleets which have automobiles with both 6 and 12-volt electrical systems. With the converters, all mobile units of 6-volt design can be used and thereby permit standardization and easy interchangeability.

Converter Unit

Dodge Trucks Have Advanced Type Engine

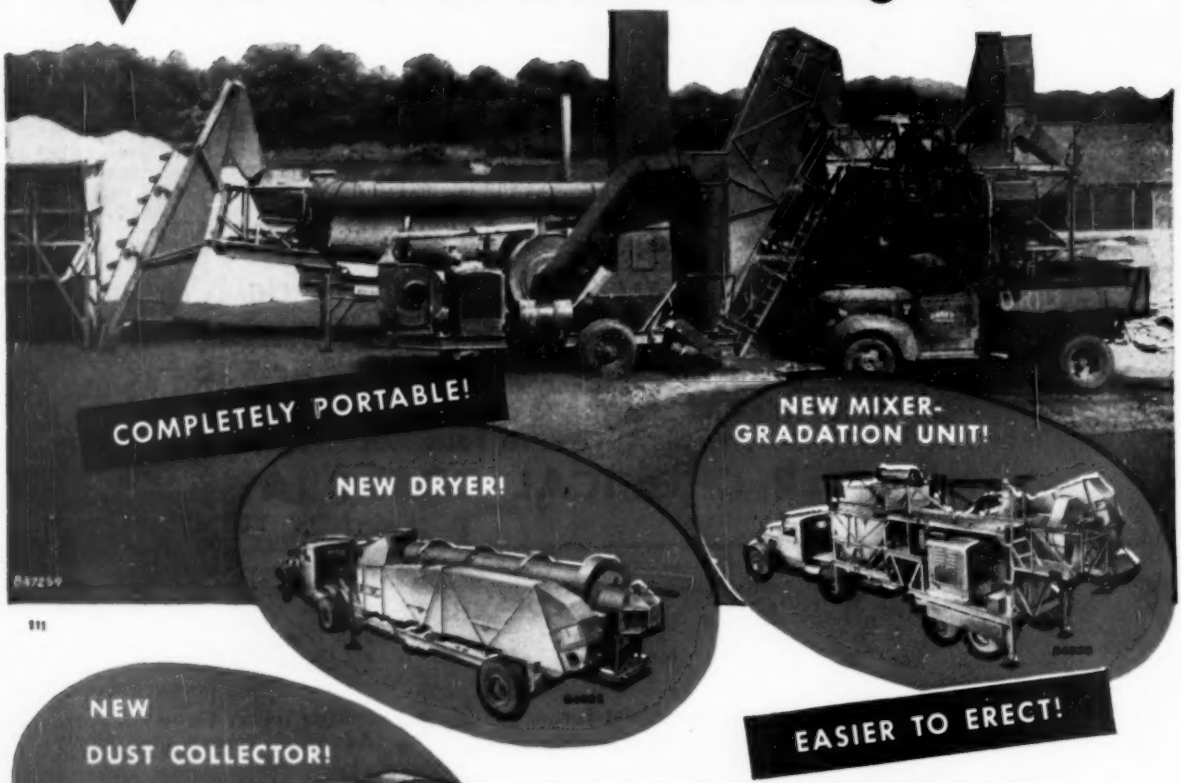
New V-8 truck engines, claimed to be the most efficient and advanced type ever offered in the industry, are among the seven power plants in the new C-1 Series of Dodge "Job-Rated" trucks announced by Dodge Division, Chrysler Corporation, Detroit 31, Mich. The new V-8 engines, power steering, more compact tractors which permit larger payloads, a new improved steering linkage, wider front treads which help increase maneuverability, new frames, increased driver comfort and visibility, lower loading height, better road stability, and completely new styling are among more than 75 new features in the new trucks. The new C-1 trucks are claimed to meet approximately 98 per cent of all hauling needs with the seven engines ranging from 100 to 172 gross horsepower, gross vehicle weights ranging from 4,250 to 40,000 lbs., and gross combination weights ranging up to 60,000 lbs.



K Model (2½ Ton) of New C-1 Series

Barber-Greene

845 Bituminous Mixing Plant



This new Barber-Greene Bituminous Mixing Plant was developed to meet specifically the need for a more completely portable, easier-to-erect plant with a capacity in the 60-ton per hour range. Here is a plant that makes the most of manpower — that minimizes the time required for setting up or dismantling — yet retains all the basic B-G advantages of accurate volumetric measurement and proportioning of aggregate and bitumen. The Utility Plant is all this and more, for it can be adapted to produce a constant flow of all types of mixes including the highest types. Each of its basic units incorporates new improvements in design to achieve the maximum in portability, simplicity in erection and operation.

Before bidding on any bituminous job, get full information on this new, advanced design Bituminous Plant. See your Barber-Greene distributor for your copy of Bulletin 845.

see your **B-G distributor** ...or write

Barber-Greene Company, Aurora, Illinois, U. S. A.

MANUFACTURERS' LITERATURE

New G-E Line of Tri-Clad Motors

The recently announced G-E line of Tri-Clad "55" motors, built in 1-30 hp ratings to latest NEMA dimensions, are described in three new four-color picture-story bulletins available from the General Electric Co., Schenectady 5, N. Y. The publications contain complete descriptions of new maintenance, performance, and protective features of the line, and each includes a double-spread cutaway drawing of the motors. A 16-page booklet, GEA-6013, covers dripproof models; enclosed motors are presented in GEA-6012, an 8-pager; and 14-page bulletin GEA-6027 described the new gear motors.

Komac Premix for Patching and Paving

A 16-page circular on Komac premix has been issued by Koppers Co., Inc., Tar Products Division, Pittsburgh 19, Pa. Outstanding features claimed for Komac include: It will not strip even when mix is fresh; it remains workable when stockpiled out of doors; it spreads and rakes easily in all weather; it does not bleed and remains skid resistant during hot weather; it does not adhere to tools and equipment; it can be opened to traffic immediately upon compaction.

Air Saw With Sabre Saw Blade

An 8-page folder on its new Model AS-221 air saw with sabre saw blade has been issued by Wright Power Saw and Tool Corporation, 292 Longbrook Ave., Stamford, Conn. It is stated that this saw cuts 6 in. by 8 in. timbers in 15 to 20 seconds at 90 lb. pressure and 12 by 12's in 45 to 65 seconds. Important features of this saw are pictured and described. Illustrations are shown of the saw in such operations as cutting off piling, cutting out overhead timbers in mines and sawing in hard to get at places where even hand saws could not be used. Specifications and data are given in the folder.

Tamping Rollers

The advantages of a new type of cleaner teeth on its giant "diamondfoot" tamping rollers are explained in a new 4-page folder issued by Road Machinery Division, Wm. Bros Boiler & Mfg. Co., Minneapolis 14, Minn. Schematic drawings and photos show how other design improvements qualify Bros sheepfoot and diamondfoot tamping equipment for a wide variety of job specifications and conditions.

Crawler Model Shovel and Crane

An unusual new product information bulletin has been issued recently by the Schield Bantam Co., Waverly, Iowa in the form of a 4-page newspaper called the Bantam City Press. The new bulletin features stories, picture, and specifications concerning Schield Bantam's new ¾ yard 5-ton crawler model C-35 as well as specifications and pictures of Bantam's all-new, specially designed crane carrier, built specifically for mounting of the new Model T-35 truck-mounted Bantam. Included in the new bulletin are coupons, offering valuable services to construction machinery users such as "how-to-do-it" information on various job applications, and specification bulletins for the Company's complete line of ¾ yd. truck or crawler-mounted power cranes and shovels.

Long-Range Material Handling Machines

A 4-page brochure on its long-range material handling machines has been published by Sauerman Bros., Inc., Dept. R-18, 522 So. Clinton St., Chicago 7, Ill. Line drawings are utilized to provide a simple explanation of how the drag scraper, slackline cableway and tautline cableway operate. Pictures showing all types of Sauerman equipment working in the field are included, along with sections on scraper storage, excavation and the use of scrapers with boom machines.

Calcium Chloride for Ice Control

A revised edition of its manual IM-1, "Calcium Chloride for Ice Control," is available from Calcium Chloride Institute, 909 Ring Building, Washington 6, D. C. The manual includes recommended procedures, treating and storage of abrasives, spreading abrasives, and direct application of calcium chloride in ice control, plus tables and charts on skid test data, melting action of treated abrasives, and specifications.

20 Types Heavy Duty Storage Batteries

A newly revised 12-page booklet on heavy duty storage batteries has been announced by The Electric Storage Battery Co., Box 8109, Philadelphia 1, Pa. Features, specifications and construction details are included for 20 types of batteries used in such heavy duty applications as gas and diesel powered trucks, tractors, and off-the-highway equipment.

Servicised
HOT POURED
Para-Plastic*
FOR POSITIVE
SEALING OF
ALL JOINTS
• MAINTAINS BOND FROM 0° TO 180° F.
• RESILIENT, ADHESIVE, ELASTIC
• ADHERES TO CONCRETE, STEEL, METALS, WOOD AND TILE
Para-Plastic sealed under joint compression.
Para-Plastic prevents infiltration of water or other foreign substances under any expansion or contraction conditions of monolithic concrete.
Contracted joint always kept sealed by Para-Plastic.
Write for complete information on Para-Plastic for sealing any joint.
NOW! Para-Plastic JF
New type Para-Plastic JF for airfield and airport construction. Resists dissolution by Jet Fuel spillage or leaks. All other Para-Plastic features included. Ask for details.
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Grotelite
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SMOOTH
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SURFACE
This highly reflective, smooth surface flexible sheeting makes a smashing, attention-compelling sign with greater day and night value. The smooth, self-cleaning surface can be screened, sprayed or brushed. It is easy to apply and makes the best long life signs and marking devices.
GREATER SAFETY
LONGER RANGE
DURABILITY
ECONOMY
Write for complete description, samples and prices.
THE Grote MFG. CO.
BELLEVUE, KY.
(Opposite Cincinnati)
STOP
STOP AHEAD

This amazing new Armstrong Starter is packed with important new features —
It is 50% lighter — smoother acting — easier to service and mount.
The principle is based on the use of friction inside a conventional rope starter cup. Actuated by a cam principle it engages after ¼ inch pull. Eliminates danger of teeth or pawls breaking — permits greater tolerances in mounting. Available with stationary or rotating screen. Competitively priced.

ARMSTRONG BULLDOG STARTER

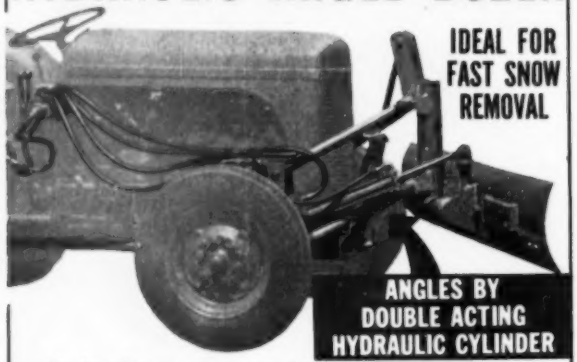
HERE'S HOW IT WORKS

1. Cam actuated teeth extend to grip inside of standard rope pulley cup.
2. Spring loading retracts teeth when pull stops.
3. Rope pulley available for hand starting in case of emergency.
4. Heart of unit can be incorporated in end products design.

If you make, sell or use products like these, you can reduce weight — improve starting — increase starter life. Chain Saws • Pumps • Power Mowers • Outboard Motors

ARMSTRONG PRODUCTS CO. • Milwaukee, Wis.

NEW SHAWNEE
HYDRAULIC ANGLE DOZER



Hydraulically controlled from driver's seat. UP, DOWN, ANGLE LEFT OR ANGLE RIGHT—eliminates dead-heading. Blade can be tilted approximately 20° by manual setting. Also, side shifting mold board permits back filling ditches with tractor operating on solid footing away from ditch. Zerk fitted. Gives wonderful performance.

• *Write for complete information*

SHAWNEE Manufacturing Company, Inc.
1947-G North Topeka, Topeka, Kans.

Diesel Engines and Electric Sets

An 8-page booklet (Form D 309) entitled "Power and Profit in Construction and Mining," which includes the story of how Caterpillar rates its Diesel engines and electric sets, has been released by Caterpillar Tractor Co., Peoria 8, Ill. The booklet includes photographs of Caterpillar diesel engines and electric sets on the job in many parts of the world in both mining and construction operations. Detailed charts showing the rated horsepower of all Cat diesel engines and kilowatt output of all Cat electric sets are included.

Stabilization with Calcium Chloride

A new 34-page manual, SM-I, "Calcium Chloride for Stabilization of Bases and Wearing Courses," issued by Calcium Chloride Institute, 909 Ring Building, Washington 6, D. C., was written to assist highway engineers, contractors, and materials suppliers when they use calcium chloride in the construction of dense graded bases and wearing courses. The manual deals with properties and design, types and methods of construction and specifications. It is well illustrated, and information is presented as a guide for both design and construction engineers. The principles and recommendations presented are the result of many years of field application and laboratory research on the subject.

Oil Resistant Driveway Sealer

A product data sheet on its new Ortar emulsion, Type D.S., has been issued by Flintkote Co., Industrial Products Division, 30 Rockefeller Plaza, New York 20, N. Y. This product is a specially formulated coal tar pitch emulsion, for application by brush or squeegee as a seal coating for apshalt paved driveways, roads or streets. It is stated to provide resistance to gasoline, oil, grease, water and actinic rays of the sun and to prolong life of pavement.

Fact Book on Use of Explosives

A new 48-page booklet and catalog titled "Atlas Explosive Products," available from the Explosives Department, Atlas Powder Co., Wilmington 99, Del., offers specific aid in the selection of industrial explosives for underground and strip mining, quarrying and construction, seismic prospecting, pipe-lining, agriculture, lumbering, oil field work and other areas. The booklet includes more than 80 illustrations and more than a score of tables. The first fourth of the booklet summarizes in text and pictures the methods and explosive materials commonly specified for most effective and economical results in nine major industries. The catalogue section described and tabulates the properties of the various types of explosives, blasting caps, fuse, blasting equipment and accessories. Included is a section of the Rockmaster (millisecond delay) system of blasting. A complete index includes more than 150 items.

100 Types of Portable Hoists

A condensed, 8-page catalog, available from Coffing Hoist Co., 800 Walter St., Danville, Ill., contains illustrations, descriptions and specifications for over 100 different types and sizes of portable hoists. Among the units described are Coffing ratchet lever hoists —both roller—and coil-chain models—with capacities from ¾ to 15 tons, a complete line of standard and specialized spur gear hoists, Quik-Lift electric hoists, versatile, all-purpose Hoist-Alls, Mighty midget pullers designed to hang on a tool belt, and a wide variety of utility maintenance tools.

Methods of Hardfacing

"Selection and Evaluation of Methods of Hardfacing," a 12-page reprint on an article that appeared in The Welding Journal, is being offered by Air Reduction Sales Co., Air Reduction Co., Inc., 60 East 42nd St., New York 17, N. Y. The major methods employed in the application of hardfacing materials are discussed, with special emphasis on the inert-gas-shielded arc process. Twenty illustrations, including photographs of overlay specimen and photomicrographs of deposits, make this booklet an easy-to-read guide in the selection of a hardfacing method for any particular application.

Bottom Deck Feed Plants for Aggregate Production

Individual bulletins describing and listing the specifications on Pioneer's new line of bottom deck feed plants for gravel aggregate production has been issued by Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn. (subsidiary of Poor & Co., Chicago). This new line consists of seven sizes of plants. Plant set-ups are shown and color diagrams trace the flow of material through the plants. The bulletins point out how bottom deck feed, a patented principle of aggregates production, can be utilized to obtain maximum efficiency from all the units in the plant through (1) balance of the loads between crushers without having to change screens and (2) use of two decks for specification sizing thus doubling the effective screening area.

Cat D6 Tractor with New Clutch

A new broadside (Form 30825) published by Caterpillar Tractor Co., Peoria 8, Ill., presents the Caterpillar D6 tractor which is now equipped with the new oil-type fly-wheel clutch. Illustrations and sectional cut-aways of the Caterpillar D6 tractor and a detailed specification sheet are included in the broadside.

CRANE

1 model 603 Lima 1½ yd., 70 ft. boom, Cat 13000 power plant, long crawlers, wide tread.

Top condition.
$15,000 FOB cars.

C. R. SUNDBOOM
2288 UNIVERSITY AVENUE
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Phone: Midway 9680

FOR SALE

Northwest 25 gas motor backhoe, serial 4705, very good condition.

Lorain 77 combination shovel and crane, Cat. diesel engine. Rebuilt July 1953.

1944 International KR11 dump trucks, 7½ cu. yds., rebuilt and new tires.

D6 Caterpillar Bulldozer. Motor just rebuilt.

A. & A. CONTRACTING & TRUCKING CO.
850 Main Street
New Rochelle, New York
Tel.: New Rochelle 6-2898

FOR SALE:

1—Allis-Chalmers HD9G Tractor with front end loader — 1952 Model
1—Transport Trailer, lowboy trailer, 22 ton carrying capacity — 1952 Model
1—A50 Mack Tractor with fifth wheel, wing tanks, etc.

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WILSON CONSTRUCTION CORPORATION
P. O. Box 1035, Radford, Virginia

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Other lengths & sections used & new at other locations in United States for rent.

We have Nation-wide reputation for effecting QUICKEST SHIPMENTS

All sizes Vulcan & McKiernan Pile Hammers & Extractors for rent—Shop Rebuilt

Regardless of location of job. Wire, Write or Phone

MISSISSIPPI VALLEY EQUIPMENT CO.
509 Locust St., Chestnut 4474, St. Louis, Mo.

Euclid Trucks 15 Ton—22 Ton End Dump—18 Yd. and 25 Yd. Bottom Dumps—12—25 Yd. Bot.-Dump without tractors.

4—Elec. Std. Ga. Dump Car locomotives—600 volt with 17—std. ga. air dump cars—25,000 lb. cap. 130 Cu. Ft. level, with all elec. equip. Goodman 10 Ton Mine Loco.—250 Volt 36" Gauge. Ottumwa Mine Hoist—1⅛" Rope—200 H.P. Motor—525 R.P.M. complete.

Jaw Crushers 36" x 48" Nordberg—36" x 48" Farrel—60" x 48"—42" x 40"—42" x 30"—24" x 36"—18" x 36"—15" x 36" Symons Cone 3½'—4'—3'—2'—36 x 40 Dixie hammer mill—54" Traylor Type T—42" McCully—48" Gyrosphere.

Shovels—Roll Crushers—Rod Mills—Ball Mills—Rotary Kilns—Dryers—Log Washers—Classifiers—Mine Hoists—Transformers—Motors—Gravel Plants—Blast Hole Drills—27T—20T—42T—Generator sets—Drag Lines. 2—25' A.C. Log Washers.

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Theatre Bldg. Tel. 500 Crosby, Minnesota

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Highest dollar value paid for new and used trucks and all kinds of used equipment. All types of truck equipment bought and sold, including war surplus. Write, phone or wire:

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Above units overhauled and in very good operating condition with good rubber. Low terms available.

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1951 Adnun Paver—Like New—Will Sacrifice.

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Complete stock of spare parts for army trucks, GMC, Studebaker, Diamond T, Ward LaFrance and White Scout car.

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The Following Excess Equipment:

315 Cu. Ft. Sullivan Air Compressor on Six Wheel Truck.
4 One Yard Amco Shovel Buckets.
4 K.B. 8F International Dump Trucks.
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1 D-7 Bulldozer, 3 T Series.
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Several Dump Bodies, 12 to 20 feet long.

Can use material handling conveyors—Hough Loader on Rubber, D-8 Bulldozers or small crane with long boom.

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Large assortment of small equipment and shop tools. Everything in excellent to very good condition. List with prices and description on request.

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The sand and gravel crushing and washing plant should have two crushers to produce from 600 to 800 tons per day.

We have a gravel deposit of 23 acres which we own and we option small pieces adjoining our deposit of about a like amount. The top surface is 70% stone, 30% sand. Thompson & Lichtner Co., Inc., consulting engineers of Brookline, Mass., made a thorough study and survey of the deposit and samples taken by them from the property have passed a very high test. **Their complete report is available.** The R. E. Chapman & Co., well-water specialists, have taken tests and borings and assure us of 800 gallons per minute available water.

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We're interested in a mutually profitable agreement on the washing and crushing and selling of the material at our property on Route 85 in Southboro, three miles from Framingham, Mass.

We want to secure some Ready Mix Concrete Concern to place the necessary machinery on our property—(we have a Railroad siding leased one mile from the deposit) and we will sell the aggregate to the Ready Mix Concern on a long term basis similar to other satisfactory agreements between several firms in the immediate area.

Also large deposit of sand for hot mix plant. The new toll road will be surfaced with hot mix. All bridges concrete.

All zoning laws and necessary permits have been complied with:

We enter our pit from a main State Highway 65 feet wide.

Boston is less than twenty miles over a new proposed Super Highway which passes within 400 yards of our deposit on which bids will be opened this winter. The exit, entrance to which is a short distance from our pit. Complete financial statements of the prosperous Sand, Gravel and Ready-mix dealers in this district available. Zoning laws prevent future competition after we are set up. A twenty-mile radius would cover Boston, Worcester, Newtonville, Waltham and Franklin.

For more details, call or write:

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1—Model D8 "Caterpillar" tractor, 2U serial number, with new track, sprockets, idlers, rollers, in excellent condition. This tractor has been a hauling unit and has canopy top, industrial type push plate and "Caterpillar" model #25 double drum rear power control unit. Price, f.o.b. Detroit, Michigan, $10,350.

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NEW 4 comp. bin. One 117 ton cement. Three 27 ton Aggregate compartments, (can furnish elevator and w/Batcher)	5,120.00

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New bulk cement bins 190 to 965 ton, combination bulk cement bins and Aggregate bins, complete with elevators weigh batchers, portable type, or will build to suit your specifications. Tell US what YOU want.

WE WANT TO BUY OR TRADE

Belt or chain bucket elevators 20" or larger buckets, 50' long or will buy parts.

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We will trade 2 yd. Truck Mixers an any of the above, or will pay cash. Full information, serial numbers, age wanted.

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Cat 12 with V plow & wing.

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Case LAI wheel tractor with Lull hydraulic loader.

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TD-18 IHC with push plates & winches.

TD-18 IHC with hydraulic dozer.

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TD-9 IHC with BE dozer shovel or hydraulic dozer.

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C2 Tournadozer with cab.

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1—1950 Model TL20 LORAIN Truck Crane equipped as clamshell and dragline with outriggers and 60' boom.

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3'—3½' or 4' Symons Cone Crusher Caterpillar D-6 Dozer or Hylift 40 to 50 ton Lowboy Ball Mill.

AVAILABLE FOR TRADE-IN OR SALE

Caterpillar D-7 Hylift 7M Series.

Int. T-9 Swing Crane Tracson Model CT9.

Telsmith Primary Breaker, Size 20A.

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44-B Bucyrus-Erie Combination Shovel-Crane.

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1 Compton Model 56 Coal Recovery Drill. 42" or 48" Bits; powered with 300 Cummins Engine, practically new.

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Equipment can be inspected at work
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Rebuilt—A1 Condition

1 Model 6 N.W. Shovel, diesel
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1 New Shovel Front for Model 6 N.W.
1 Used Shovel Front for Model 25 N.W.

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1 new Model E gutter-snipe South Bend street sweeper, gas engine driven
(present factory price — $7,900)
(priced to move quickly—$6,000)

1 rebuilt 1950 Model 40 Austin-Western street sweeper, Serial #P3154—$3,200

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(present factory price—$14,500)
(bargain price—$13,000)

2 almost new P&H 255A truck cranes 20 ton—new in November, 1952

1 almost new P&H 255A 1953 trenchoe attachment, ¾ cu. yd. latest gooseneck type; factory price—$3,970; used 1 month—$3,000

30 slightly used P&H WH301 latest type, gas engine driven electric welders, mounted on 4 wheel pneumatic tired trailers. These welders used 5 months in rental—new in November, 1952
(present factory price—$1,545)
(bargain price—$900.00)

1 almost new Galion 303 tandem drive motor grader, 50 h.p., gas with starter
(present factory price—$8,300)
(used 1 month—$6,800)

1 rebuilt #12 Caterpillar diesel motor grader, tandem with scarifier—$5,500

1 rebuilt American #8 motor patrol grader, gas—$3,500

1 rebuilt #99 Austin-Western motor grader, gas, heavy duty—$3,500

1 used Caterpillar #10 tandem motor grader—$2,000

1 used Adams #51 diesel tandem motor grader—$2,000

1 LeRoi 500 cu. ft. portable powered by Cat. D-13000 diesel engine
(used 5 months—$8,500)

1 rebuilt #75 Jaeger, gas—$1,000

1 rebuilt 315 Ingersol, gas—$1,800

1 rebuilt 210 Worthington, gas—$2,000

1 rebuilt 160 Worthington, gas—$1,600

2 rebuilt 315 Worthington, gas—$2,800

1 rebuilt 105 Gardner-Denver—$1,500

1 almost new Essick 1½-2 ton tandem roller—used 1 month—$1,800

1 rebuilt 3 ton tandem Buffalo-Springfield roller—$1,800

2 rebuilt Galion portable 3-ton tandem rollers, gas—$1,800

1 rebuilt 10 ton tandem Buffalo-Springfield diesel—$3,500

1 rebuilt Minneapolis-Moline UTI 47 h.p. tractor, rubber tired with new White loader ⅝ cu. yd—$2,500

1 rebuilt Power Horse tractor 40 h.p. complete with bucket and loader—$1,500

1 rebuilt HD7 Allis-Chalmers diesel crawler tractor with loader—$3,500

1 rebuilt Case rubber tired tractor with new White front end loader—$1,500

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1 rebuilt Hanson 1948 Model 31 backhoe on crawlers—$3,500

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13 Tons 9" x 15# x 55/60'
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3 D8 Tractors — Just completely rebuilt High 8R Series. All of these tractors were bought new by us and maintained and rebuilt by experts.

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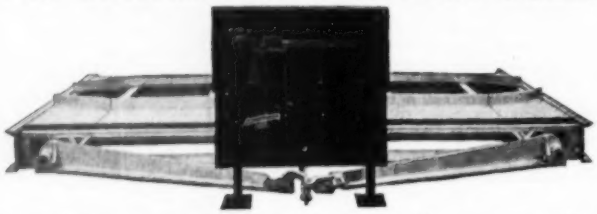

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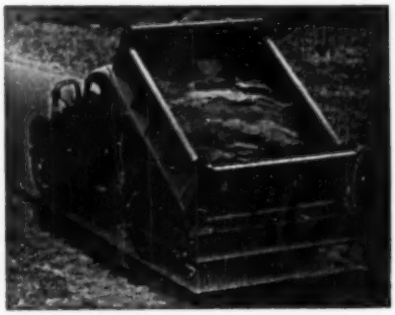


WITH THE MANUFACTURERS & DISTRIBUTORS

Gallon Announces Burnup Resignation. Effective Jan. 1, Robert H. Burnup will relinquish his position as district representative for The Gallon Iron Works & Mfg. Co., Gallon, O., in the mid-west territory. Mr. Burnup will devote his entire time to the distribution and selling of Gallon motor graders and rollers, as well as other types of construction equipment, through his new business, the Burnup Equipment Co., 11303 Truman Road, Independence, Mo.

Gehring Joins Wire Reinforcement Institute. Donald M. Gehring, in advertising and broadcasting since 1935, has been named assistant director of Wire Reinforcement Institute, Inc., Washington, D. C. He will handle public relations. Prior to his appointment, Gehring was with General Motors Institute, Flint, Mich.

Smith Appointed Field Engineer. Harry A. Smith has been appointed field engineer for the Calcium Chloride Institute, Washington, D. C. He will provide engineering service for the users of Calcium Chloride in the northcentral states.

Hinds Joins Ulrich Products. O. Q. Hinds, formerly associated with Caterpillar Tractor Co. as motor grader consultant, has joined Ulrich Products Corporation, Roanoke, Ill. as general consultant. He recently retired from Caterpillar after 19 years of service.

Allis-Chalmers Takes Over Buda. The Allis-Chalmers Co., Milwaukee, Wis., on Nov. 1 officially assumed operations of The Buda Co., 72-year old Harvey, Ill. firm. The firm will be operated as "The Buda Co., a division of Allis-Chalmers." Ralph K. Mangan, with Buda for 36 years and president since 1950, will be in charge of the division with the title of president and general manager.

Marlow Pumps Merges with Bell & Gossett. Marlow Pumps, Ridgewood, N. J., manufacturer of self-priming centrifugal pumps, merges as of Dec. 1 with the Bell & Gossett Co., Morton Grove, Ill., manufacturers of hot water circulating pumps, universal pumps, heat exchangers flow control valves and other heating specialties. Under the new set-up, Marlow Pumps will be known as the Marlow Division of Bell & Gossett and will be handled by A. S. Marlow, Jr., as general manager. He will also be vice president and a member of the board of directors of Bell & Gossett.

Lell Made Sales Manager. Elmer J. Lell, heretofore assistant sales manager, has been appointed sales manager of Wall Colmoney Corp., Detroit, Mich.

Leschen Establishes New Sales District. A new sales district covering Texas, Louisana and Oklahoma has been established by Leschen Wire Rope Division, H. K. Porter Company, Inc., St. Louis, Mo. The new district has headquarters in Houston, Tex. and will be managed by F. E. Suder.

Robertson Elected Armco Vice President. William O. Robertson, manager of the eastern division of Armco Drainage & Metal Products, Inc., Middletown, O., has been elected a vice president of the company. Mr. Robertson was made manager of the eastern division in 1953 and will continue to hold that position in addition to his responsibilities as vice president of the company.

New Joy Distributors. Joy Manufacturing Co., Pittsburgh, Pa., has appointed the following distributors for its line of construction equipment: American Machine Co., West 1026 Broadway, Spokane, Wash., for eastern Washington and northwestern Idaho, Iowa FWD Truck & Equipment Co., 1604 Grand Ave., Ames, Ia.; Industrial Marine Supply Co., Pensacola, Fla., for northwestern Florida; and All Wheel Drive Co., 1344 West Third St., Davenport, Ia., for portions of eastern Iowa and western Illinois.

Spicer Heads Bosch Service Sales. American Bosch Vice President Donald H. Spicer, who has been in charge of manufacturers sales for American Bosch Corporation, Springfield, Mass., is now also in charge of service sales activities for that company. Vice President W. C. Robinson, who formerly had charge of service sales, is now heading the project of constructing an American Bosch branch plant in Columbus, Miss. and is devoting all his time to that activity.

Milligan Joins American Tractor. D. A. Milligan, formerly sales manager of Harry Ferguson, Inc., has been appointed vice president in charge of sales of the American Tractor Corporation, Churnbusco, Ind.

Baker to Construct New Plant. Baker Manufacturing Co., Springfield, Ill. will construct a new 40,000 sq. ft. $600,000 plant at Beardstown, Ill. This is another step in their $2,000,000 overall plant expansion.

New Euclid Distributor. Western Tractor & Equipment Co., 2230 First Ave., South, Seattle, Wash. has been appointed distributor by The Euclid Road Machinery Co., Cleveland, O., for western Washington and Alaska.

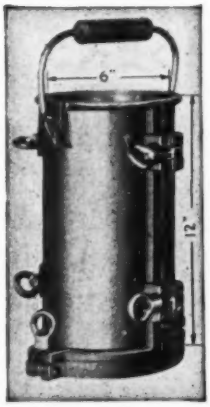
Hyster Appoints New Seattle Manager. Martin Larson has been appointed manager of Hyster Co., Seattle, Wash. He succeeds Fred Welch who recently was made manager of the San Francisco office. Fred D. Robinson, formerly with A. H. Cox Co. succeeds Mr. Larson as manager of the Spokane branch.

Sheffer Made Regional Sales Manager. Robert R. Sheffer, formerly sales representative with Marion Metal Products Co. has been named regional sales manager for the Ohio, West Virginia, Michigan, Western Pennsylvania, and Western New York territory of The Gallon Allsteel Body Co., Gallon, O.

Spannhake Named Engineering Head. E. W. Spannhake, well known mechanical engineer and consultant has been named director of engineering and research for Le Tourneau-Westinghouse Co., Peoria, Ill.

New Lima Distributor. McNail Machinery & Supply Corporation, 600 Dave N.W., Des Moines, Ia. has been appointed distributor by Baldwin-Lima-Hamilton Corporation, Lima, O., for Lima shovels, cranes, draglines and pull-shovels in central and eastern Iowa.

U. S. Rubber Tire Sales Appointments. The appointment of three new regional managers and two sales engineers in con-



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Construction tire sales has been announced by J. F. Arthur, truck tire sales manager of the U. S. tires division of United States Rubber Co., New York, N. Y. Ben F. MacCormack, new Eastern regional manager, will make his headquarters in New York. Henry Hitchins has been appointed sales engineer for construction tire sales in the east, and will be under the direction of Mr. MacCormack. C. N. Clabough has been named Central regional manager, with headquarters in the Chicago branch, and Dugald McKinnon has been appointed Western regional manager, with offices in Denver. Joseph Bernat has been appointed sales engineer to assist Mr. McKinnon in the western region.

Thibaut Made Thew Service Manager. R. G. Thibaut has been appointed service manager of Thew Shovel Co., Lorain, O. and C. W. Raby has been appointed assistant service manager. Mr. Thibaut succeeds R. P. Kelly who recently passed away.

New Woolridge Distributor. Southwood Machinery Sales, Indianapolis, Ind., has been appointed exclusive distributor for Woolridge earth moving equipment for the entire state of Indiana with the exception of Lake, Porter and LaPorte counties.

Burtch Made Roebling Product Sales Manager. Forest S. Burtch has been appointed product sales manager of the newly formed Construction Materials Department of the John A. Roebling's Sons Corporation, a subsidiary of the Colorado Fuel and Iron Corporation. Elmer A. Trask succeeds Mr. Burtch as wire rope sales manager. Both men will work out of the corporation's Trenton, N. J. headquarters. The creation of the Construction Materials Department makes available, through a single source, the complete Roebling line of wire and stranded steel products for prestressing concrete.

Killebrew Joins Clark Equipment Co. Clarence E. Killebrew, formerly general sales manager for The Frank G. Hough Co. has been appointed manager for marketing and sales of the Construction Machinery Division of Clark Equipment Co., Buchanan, Mich.

P & H Appoints Edwards General Manager. Frank C. Edwards, heretofore sales manager of the small excavator division, has been appointed general manager of the P & H Diesel engine division in Crystal Lake, Ill., of Harnischfeger Corporation, Milwaukee, Wis.

Kuehneman Appointed Sales Manager. Roy C. Kuehneman, for the past 8 years in the sales department of Good Roads Machinery Corporation, Minerva, O., has been appointed sales manager.

Meyer New Sauerman Sales Manager. Martin Meyer, for the past 10 years assistant sales manager, has been appointed general sales manager of Sauerman Bros. Inc., Chicago, Ill. to fill the vacancy caused by the death of Dwight D. Gulfoil.

Sullivan Heads Le Roi Contractor Sales. Paul D. Sullivan has been named manager of contractors sales for the Construction and Mining Division of Le Roi Co., Milwaukee, Wis. He will be responsible for Le Roi sales to large contractors.

Barber-Greene Opens Canadian Plant. Barber-Greene Co., Aurora, Ill., has formally opened their new factory and office facilities near Toronto, Ontario, Canada. The new plant, is operated by Barber-Greene Canada, Ltd., a subsidiary of the parent company. At present, it is engaged in the manufacture of belt conveyors. Expansion into other of the company's lines, ditch diggers, bucket loaders, portable conveyors, car unloaders, mine conveyors, asphalt mixing and paving equipment, is contemplated for the future. The existing facilities encompass some 30,000 sq. ft. and are situated on a 16 acre plant site, providing ample room for future building expansion.

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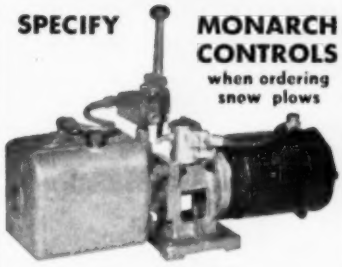

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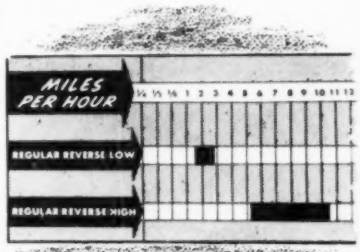

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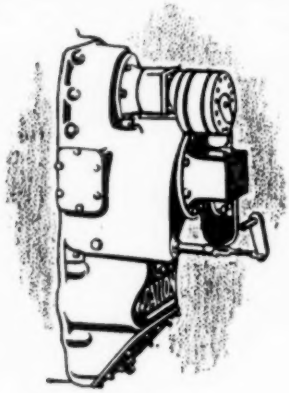

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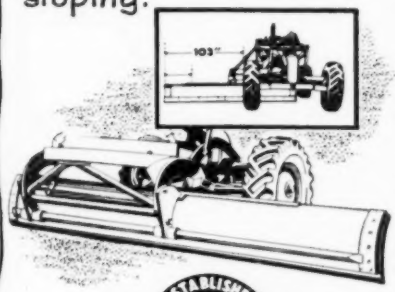

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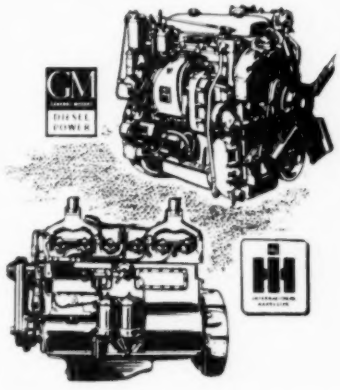

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